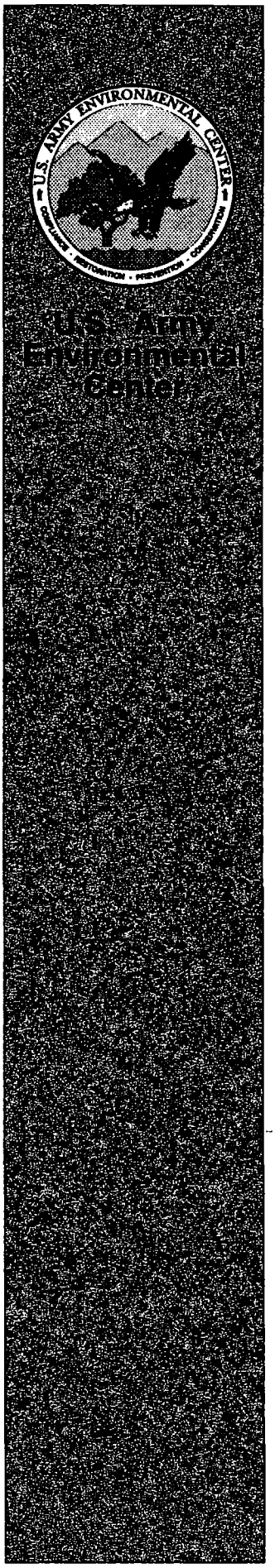

FINAL

Preliminary Assessment

of

FORT CARSON, COLORADO

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Under contract with the US Army Environmental Center, Engineering Technologies Associates, Inc. conducted a Preliminary Assessment of Fort Carson, CO. The purpose of the investigation was to collect and review all available documents regarding past practices for hazardous waste storage and disposal, and to assimilate that information into this report. The investigation included a site visit to Fort Carson, and visits to offices of other agencies to collect information pertinent to the report.

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LIST OF ACRONYMS AND ABBREVIATIONS

AAFES	Army Air Force Exchange Services
ACM	asbestos containing material
AFB	air force base
AST	aboveground storage tank
AVN	aviation
BAA	Butts Army Airfield
CASH	Combat Army Surgical Hospital
CCS	City of Colorado Springs
CDH	Colorado Department of Health
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cfs	cubic feet per second
COD	chemical oxygen demand
CS	concentrated smoke
DARCOM	U.S. Army Materiel Development and Readiness Command
DCA	1,1-dichloroethane
DCE	cis 1,2-dichloroethene
DEH	Directorate of Engineering and Housing
DIVARTY	Division Artillery
DNT	dinitrotoluene
DPCA	Directorate of Personnel and Community Activities
DRMO	Defense Reutilization and Marketing Office
EOD	explosive ordnance disposal
EP	extraction procedure
ES&E	Environmental Science and Engineering, Inc.
ETA	Engineering Technologies Associates, Inc.
Fry/Ark	Frying Pan/Arkansas Transmountain Water Project
FSB	Forward Support Battalion
FTC	Fort Carson
gpm	gallons per minute
HHC	Headquarters and Headquarters Company
ICF	ICF Technology Incorporated
IWTP	industrial waste treatment plant
LFWQMA	Lower Fountain Water Quality Management Association
MEDDAC	U.S. Army Medical Department Activity
mg/kg	milligrams per kilogram
mg/l	milligrams per liter
MLRS	Multiple Launch Rocket System
MSB	Maintenance Support Battalion
NOV	notice of violation
NPDES	National Pollutant Discharge Elimination System
PA	preliminary assessment

PCE	perchloroethylene
PCMS	Pinon Canyon Maneuver Site
POL	petroleum, oil, lubricants
PPE	probable point-of-entry
RCMWD	Rock Creek Mesa Water District
RCRA	Resource Conservation and Recovery Act
RDX	trinitrotrimethylenetriamine (1,3,5-triaza-1,3,5-trinitro-cyclohexane)
RMIS	Restoration Management Information System
RRWD	Red Rock Water District
SARA	Superfund Amendment and Reauthorization Act
SHWD	Stratmoor Hills Water District
SSB	Supply Support Battalion
SWSD	Security Water and Sanitation District
STP	sewage treatment plant
TCA	trichloroethane
TCE	trichloroethylene
TCLP	toxic characteristic leaching procedure
TDS	total dissolved solids
TNT	trinitrotoluene
TOC	total organic carbon
TPH	total petroleum hydrocarbons
TSD	treatment, storage, disposal
TSDF	treatment, storage, or disposal facility
USAAA	U.S. Army Audit Agency
USACIDC	U.S. Army Criminal Investigation Division Command
USAEC	U.S. Army Environmental Center
USAEHA	U.S. Army Environmental Hygiene Agency
USGS	U.S. Geological Survey
UST	underground storage tank
UXO	unexploded ordnance
WHWC	Widefield Homes Water Company

EXECUTIVE SUMMARY

Engineering Technologies Associates, Inc. (ETA) performed a Preliminary Assessment (PA) of Fort Carson, Colorado, including a site visit and review of all available relevant documents. No environmental sampling was conducted as part of this investigation.

Fort Carson has been owned by the U.S. Government since 1942. It has been operated by the U.S. Army since then as an active training installation. Fort Carson serves several tenants, including the 3650th Colorado National Guard; the 3/87 Army Reserve component; the Defense Reutilization and Marketing Office (DRMO); the Joint Personal Property Shipping Office; the U.S. Army Audit Agency (USAAA) (Western Region); the 6th Region U.S. Army Criminal Investigation Division Command (USACIDC); the Naval Reserve Center; the Defense Printing Service; and the Defense Financial Accounting System. Fort Carson has two sub-installations, one at Fort Missoula, Montana, and the other at Fort Douglas, Utah.

The principal industrial operation at Fort Carson is repair and maintenance of vehicles and aircraft. Activities associated with this operation include routine oil changes and lubrications, washdowns, painting, refueling, battery repair, radiator servicing, brake repair, tune-ups, component rebuilding, transmission repair, parts machining, and engine rebuilding. Some other industrial operations that have been conducted at Fort Carson since 1942 include painting, photographic and printing activities, processing excess materials and property for disposal, small-arms reconditioning, and drycleaning.

Thirty-nine sources of potential environmental contamination by CERCLA substances were identified at Fort Carson, including:

- landfills,
- burning and detonation grounds,
- an oily-waste equalization basin,
- battery shops,

- a former vapor degreasing operation,
- drainage ditches,
- hazardous waste storage areas,
- sewage treatment lagoons and areas of treated sewage land application, and
- a former print shop.

The most significant pathway of potential contamination migration on Fort Carson is the groundwater pathway. Six locations of suspected releases to groundwater were identified. Four locations of suspected releases to surface water were also identified, as were 37 locations of suspected soil contamination. No suspected releases to the air pathway were documented.

Fort Carson is located immediately upgradient of the Fountain Creek alluvial aquifer, an aquifer that is used extensively for municipal and agricultural water supplies. However, no evidence was located to demonstrate that contamination from locations on Fort Carson has migrated to that aquifer. Other targets for potential contaminant migration from Fort Carson include wetlands along Fountain Creek, habitat of five federal- or state-listed threatened or endangered species, and nearby population centers, including the municipalities of Colorado Springs, Stratmoor Hills, Security, Widefield, and Fountain.

Although suspected releases to the groundwater pathway have been documented, low concentrations, limited migration potential, and large distances to receptors lead to the conclusion that observed groundwater contamination at Fort Carson presently poses limited risk to human health or the environment. There is no evidence to indicate that groundwater contamination has migrated beyond the boundaries of Fort Carson.

Suspected releases to the surface water pathway at Fort Carson have generally been of a sporadic nature and of low quantity. Little risk to human health or the environment is posed by suspected surface water contamination at Fort Carson.

1.0 INTRODUCTION

This Preliminary Assessment (PA) of Fort Carson, Colorado was prepared by Engineering Technologies Associates, Inc. (ETA) under Contract No. DACA31-92-D-0045, Delivery Order 0008, for the U.S. Army Environmental Center (USAEC). The objective of this investigation is to review all available information and applicable guidance, perform a site reconnaissance, and accumulate this data into the PA report which is required for all federal facilities placed on the Federal Facilities Hazardous Waste Compliance Docket. Fort Carson was placed on the docket in 1988, and the CERCLIS number for the facility is CO2210020150. This PA was prepared in compliance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and the Superfund Amendments and Reauthorization Act (SARA). Potential Hazardous Waste Site Preliminary Assessment Forms are included in Appendix A.

Activities performed in conjunction with preparing this report included a review of documents in the files of the USAEC, Fort Carson, and the Colorado Department of Health. Visits and/or telephone calls were made to document target populations, biota, and sensitive environments in the area. The site reconnaissance phase of this investigation was conducted from March 21, 1994 through March 29, 1994, by Mr. Kim Walters, Ms. Isobel McGowan, and Mr. Robert Lewis of ETA. ETA personnel were accompanied by Ms. Laura Haslbeck and Mr. James Roche of the USAEC, and by Mr. Robert Noyes, Mr. John Cloonan, and Mr. Steve Snyder of Fort Carson.

2.0 SITE DESCRIPTION, OPERATIONAL HISTORY, AND WASTE CHARACTERISTICS

2.1 Location

Fort Carson (38°45'N, 104°47'W) is located in the east-central portion of Colorado at the foot of the Rocky Mountain Front Range. The installation, occupying more than 138,000 acres in El Paso, Fremont, and Pueblo counties, is approximately 8 miles south of Colorado Springs and 75 miles south of Denver (see Figure 2-1). Fort Carson is roughly triangular in shape, bounded by Colorado State Road 115 on the west and by Interstate 25 on the east. The installation is approximately two miles wide at the north end and 15 miles wide at the south end, and about 24 miles in length from north to south.

Fort Carson is situated in the Front Range urban corridor that extends along the east side of the Rocky Mountains from Colorado's northern to southern boundaries. The Front Range urban corridor is a rapidly-growing metropolitan area with ever-decreasing rural areas separating the major municipalities of Fort Collins, Denver, Colorado Springs, and Pueblo. Agricultural land is the predominant land use east of the municipalities making up the urban corridor. To the west, the topography rises rapidly to the Rocky Mountains, and includes grazing land, National Forests, and State and National Parks.

Access to Fort Carson is via one of several entrance gates. The installation is an open post, with three entry gates attended. No identification checks are performed during working hours, between 0500 hours and 1900 hours.

2.2 Site Description

The main installation areas are:

- the cantonment area at the northern apex;
- Butts Army Airfield, six miles south of the cantonment area near the east boundary;

- unimproved or open operations land; and
- the Pinon Canyon Maneuver Site (PCMS), a non-contiguous parcel comprising about 260,000 acres, located about 150 miles southeast of Fort Carson proper.

The eastern portion of Fort Carson is in the Colorado Piedmont section of the Great Plains Province. The western portion is in the foothills of the Rampart Range section of the Southern Rocky Mountains Province. Low plains, high plains, and low hills are the primary land forms. Low plains dissected by Fountain Creek tributaries dominate the easternmost area of the installation. The southeast, west-central, and western portions consist of gently to strongly rolling high plains. The west-central portion is characterized by low hills with rounded to sharp-crested hills, rocky surfaces, and some gently rolling uplands and shallow canyons with nearly vertical walls. The cantonment area is located in the high plains land form. Elevations above mean sea level range from 5,400 to 6,200 feet in the low plains, 5,400 to 6,400 feet in the high plains, and 6,000 to 6,800 feet in the low hills.

The climate in the Fort Carson region is semiarid. Despite the latitude and elevation of the site, temperatures are relatively mild. The mean maximum temperatures in the area are about 85°F in July and 42°F in January. Mean minimum temperatures range from 57°F in July to 16°F in January. Extremes in temperature are relatively rare and of short duration in this area.

Due to the distance of Colorado from major sources of moisture, eastern-moving storms lose much of their moisture in passage over mountain ranges to the west; a large part of the remaining moisture falls as rain or snow on the mountain tops and westward-facing slopes. Fort Carson, lying on the eastern slope, receives relatively small amounts of precipitation from these storms. Annual precipitation in the area averages 15.7 inches, with the 2-year 24-hour event reported at 1.95 inches (Higginbotham et al, 1976). Because cold air cannot carry significant amounts of moisture, storms moving from the north into Fort Carson have very low moisture contents. The frequency of such storms increases during the fall and winter months, and decreases rapidly in the spring. Snowfall occurs primarily from September to May, with the heaviest snowfall in March. Average annual snowfall in the area is 42.9 inches.

2.3 Operational History and Waste Characteristics

2.3.1 History of the Installation

Fort Carson is an active military training facility for both weapons qualification and field training. It is home to the 4th Infantry Division (Mechanized). The primary mission of Fort Carson is the training and readiness of all assigned and attached troops to ensure combat-ready forces. Fort Carson also serves several off-post satellite units and activities in its geographical area of responsibility, and has two sub-installations, Fort Missoula, Montana, and Fort Douglas, Utah. Fort Carson training, administrative, logistical, and other services are also utilized by the U.S. Air Force Academy, Cheyenne Mountain Air Force Base (AFB), Peterson AFB, and 58 Reserve components in nine states. Tenant organizations at Fort Carson include the 3650th Colorado National Guard; the 3/87 Army Reserve Component; the Defense Reutilization and Marketing Office (DRMO); Joint Personal Property Shipping Office; U.S. Army Audit Agency (USAAA) (Western Region); 6th Region U.S. Army Criminal Investigation Division Command (USACIDC); Naval Reserve Center; Defense Printing Service; and Defense Financial Accounting System.

Construction of Fort Carson began in 1942, shortly after the bombing of Pearl Harbor. The installation was known originally as Camp Carson, and served primarily as a training facility for more than 100,000 soldiers during World War II. The 71st, 89th and 104th Infantry Divisions trained at the installation. The fort was also the site of the Mountain Training Center, the Army Nurse Corps Training Center, and an internment camp for 9,000 German and Italian prisoners of war.

In 1946, the War Department declared Fort Carson a permanent military post. Activities at the fort were greatly reduced, and only 600 personnel remained at the site. During the 1950s, the mission of the fort continued to be basic and advanced training for combat-ready troops. Reserve and National Guard units were located onsite during the Korean Conflict. The fort also served as a separation center where more than 100,000 soldiers were processed between 1951

and 1953. In 1954, the name of the installation was officially changed from Camp Carson to Fort Carson.

In 1961, Fort Carson was selected as the site for a new army training center, but the center was phased out after one year. The 5th Infantry Division (Mechanized) was activated and stationed at the fort between 1962 and 1964. Several events occurred in 1965 that physically changed the installation. Camp Hale, near Leadville, Colorado, was closed, and all of its buildings were transferred to Fort Carson (ES&E, 1983). The camp had been used as a recreation area for Fort Carson since 1957. In addition, approximately 78,500 acres were acquired, increasing the size of the installation to 138,500 acres. The fort was now large enough to support and train an entire division. Concurrently, military strength at the fort was increased from 10,000 to 25,000 troops between 1965 and 1967 with the escalation of the Vietnam Conflict. Also in 1965, two floods occurred in the region that caused major damage to the area and the fort. The first flood resulted in the loss of several lives and $100 million in damage to the region. Another flood that summer caused $160,000 in damages at the installation.

Throughout the 1970s, the mission of the fort continued to be the maintenance and training of combat-ready troops. The 4th Infantry Division (Mechanized), also known as the "Iron Horsemen," was deployed to Fort Carson from Vietnam. As of 1994, operations at the fort were carried out by approximately 22,000 personnel, including 4,300 civilians (R. Noyes, written communication, 1994).

The developed (cantonment) area of Fort Carson is located at the northwest tip of the reservation and is contiguous with the southern boundary of the city of Colorado Springs. This approximately 6,000-acre area contains most of the facilities on Fort Carson, such as troop and family housing; administrative, maintenance, fire support, recreation, supply and storage facilities; utilities; and some military training areas.

Butts Army Airfield (BAA) is located approximately six miles from the main cantonment area and occupies 570 acres. BAA also has administrative, maintenance, fire support, supply, and

storage facilities; utilities; and recreation areas. The remaining area of Fort Carson is unimproved operations lands, used for live fire artillery, small arms practice, maneuver operations, and bivouac training.

The Pinon Canyon maneuver site (PCMS) comprises about 260,000 acres located about 150 miles southeast of Fort Carson proper. PCMS was acquired by the Army in the early 1980s. Since about 1985, training exercises have been conducted at this facility. Training is conducted in 30-day sessions for up to 6,000 troops once or twice each year, although 12,000 National Guard troops also performed training exercises there one year. Between 8 and 11 military and civilian personnel are on-site daily at the PCMS cantonment area.

2.3.2 Water Supply, Water Use, and Wastewater Disposal

Fort Carson purchases treated water from the City of Colorado Springs (CCS) for domestic, industrial, and irrigation use in the cantonment area. From 1974 through 1980, the quantity purchased averaged 3,400 acre-feet per year (Leonard, 1984). More recently, CCS personnel estimated that Fort Carson purchases over 2,750 acre-feet per year (Lamar Burch, CCS, personal communication, 1994). Potable water used in downrange training areas on Fort Carson is transported to areas of activity from the cantonment area, as needed (Rich Pilatzke, Fort Carson, personal communication, 1994).

Surface water is diverted from Little Fountain, Little Turkey, Turkey, Red, and Rock Creeks for direct use in irrigation and for storage in reservoirs. Reservoirs provide flood control, regulation of diversion ditches, and opportunities for military training related to maneuvers and water purification. Fort Carson uses water from Keeton Reservoir (along Route 115 on the western boundary of the installation) to recharge reservoirs in the southern portion of the installation Reservoirs on Fort Carson are extensively used for recreation, wildlife-habitat management, and conservation. Water from the reservoirs is used for irrigation, construction, and firefighting. Wells located throughout Fort Carson are used to provide water for military training, recreation, irrigation, fire control, dust suppression, construction, and wildlife.

Wastewater from the cantonment area is conveyed by sewer to the sewage treatment plant (STP). Treated wastewater is released to an unnamed tributary of Fountain Creek adjacent to and south of the STP. During the irrigation season, some of the wastewater is disposed by applying it on the Fort Carson golf course.

Construction of the industrial waste treatment plant (IWTP) was completed in 1981 to provide treatment of oily wastewater. Prior to construction of the IWTP, wastewater from most vehicle wash racks was discharged to the storm drainage system. Until the late 1940s, waste oil from maintenance areas was spread on roads and ranges for dust control, or was placed in landfills.

2.3.3 Industrial Operations

The principal industrial operation at Fort Carson has been the repair and maintenance of vehicles and aircraft. The Consolidated Maintenance Facility (Building 8000) performs specialized repair of tactical and heavy construction and engineering equipment. Vehicle maintenance at all unit motor pools includes routine oil changes and lubrications, washdowns, painting, and refueling. Other vehicle maintenance activities include battery repair, radiator servicing, brake repair, tune-ups, component rebuilding, transmission repair, parts machining, and engine rebuilding.

Aircraft maintenance has been performed since the 1940s. Increased use of helicopters in Army operations has expanded aircraft maintenance operations at Fort Carson in recent years. Aircraft maintenance is performed by the Directorate of Industrial Operations and by various military units in hangar facilities at Butts Army Airfield.

The Directorate of Engineering and Housing (DEH) operated a paintshop in Building 207 until about 1980. Waste generated at this facility, including approximately 60 liters per month of paint thinner and residue from brush and sprayer cleaning, was reportedly dumped into a sink that discharged to the sanitary sewer. An exhaust-vented spray booth used in this shop was removed in 1980.

The Training and Audiovisual Support Center operated a photographic shop in Building 6138, which reportedly produced about 2.6 gallons per week of silver-containing fixer, and about 5 gallons per week of developer from the standard film processing operation. In addition, about 100 gallons per month of waste fixer, developer, and bleach are generated by E-6 process developing. Intermittent silver recovery efforts began in 1972. Silver is currently recovered from the standard fixer, except for small, hand-processed batches, which are discharged without recovery. Silver is not recovered from E-6 wastes, which reportedly contain little silver. All liquid waste from the photographic shop is discharged to the sanitary sewer.

The DRMO, a tenant activity at Fort Carson, receives excess materials and property from federal facilities located in Wyoming and Colorado and processes them for disposal.

Historical operations include a small-arms reconditioning operation located in Building 8000. The reconditioning operation, conducted from 1971 to 1977, included a parkerizing metal finishing process. The plating tanks and related equipment for parkerizing were dismantled and removed when the operation was discontinued. It was reported that, at its peak during the early 1970s, the small-arms reconditioning operation processed 3,000 weapons per month (ES&E, 1983).

Drycleaning was performed onpost in Building 401 from 1942 to 1981. The equipment for this operation has been dismantled and removed.

2.3.4 Hazardous Substances Management, Storage, and Disposal Practices

Hazardous substances used, stored, and disposed at Fort Carson are handled in accordance with the Hazardous Waste Management Plan (Fort Carson, 1994a). As hazardous waste is generated at locations around the installation (motor pools, vehicle maintenance, building construction/demolition, etc.) the wastes are collected at satellite accumulation points. Wastes

for each waste stream[1] are collected at the satellite accumulation point up to a maximum of 55 gallons total. When a satellite accumulation point approaches or reaches the maximum capacity, the waste is transported to the treatment, storage, and disposal facility (TSDF) (Source 17, FTC 025) where it is contracted for off-site disposal. Table 2-1 presents a list of hazardous waste satellite accumulation points at Fort Carson.

Table 2-1. Hazardous Waste Satellite Accumulation Points

Point No.	Bldg. No.	Operator
1	9072	4th Engineers
2	501	124 Signal
3	749	104th Military Intelligence
4	1682	1/3rd Air Defense Artillery
5	8110	Mobilization Training Equipment Site (#64)
6	Range 145	Range Control, Downrange
7	Range 123	Air Burst Range Control, Buckley Air National Guard, Downrange
8	MPRC	Range Control, Multi-Purpose Range Complex, Downrange
9	3669	Aviation Maintenance Shop, Pikes Peak Community College
10	7501	Hospital Maintenance Contractor & MEDDAC
11	8007	Force Integration Vehicle Storage Branch
12	1302	Directorate of Engineering and Housing Maintenance

[1] A waste stream is a specific kind of waste; for example, spent solvent, waste oil, batteries are each a separate waste stream.

Table 2-1 (continued)

Point No.	Bldg. No.	Operator
13	NCFS	Naval Construction Forces (SEEBEES), Downrange
14	8030	704th Maintenance Support Battalion (MSB), Company C, D, & E
15	8300	704th Maintenance Support Battalion (MSB)
16	401	740th MSB, Company A (Class II & IV)
17	1692	5/29th Field Artillery & 172nd Chemical Company
18	8113	CMS #5
19	8930	U.S. Army Reserve Center, Equipment Concentration Site, #42
20	8030	64th Forward Support Battalion, Company B
21	1882	31st Chemical Company & 3/29 Field Artillery
22	1982	Battery C, MLRS, 10th Field Artillery, Battery A, 26th FA
23	2692	1/12th Infantry Battalion
24	2992	2/12th Infantry Battalion
25	3092	3/68th Armor Battalion
26	8200	64th Forward Support Battalion
27	1382	4th Forward Support Battalion
28	2792	HHC 1st Brigade & Log School Generator Shop
29	2946	HHC, 3rd Brigade
30	2392	1/8th Infantry Battalion
31	2492	2/77th Armor Battalion

Table 2-1 (continued)

Point No.	Bldg. No.	Operator
32	2082	2/35th Armor Battalion
33	9628	1/4th Aviation Battalion (AVN), 4/4th AVN, Co F, 2/158th Air
34	515	AAFES Gas Station
35	207	Paint Shop
36	2496	HHC 3rd Brigade
37	9604	4th AVN, Company F, 1/10 Cav, Co E, Medical Detachment
38	4633	10th CASH
39	4634	4 SSB
40	9620	1/4th AVN
41	8152	360th Transportation Battalion
42	8030	4th FSB, Company A
43	8152	10th Mobile Army Surgical Hospital & 73rd Trans Battalion
44	1982	HHB DIVARTY
45	8142	183rd Maintenance Battalion
46	3292	299th Engineer Battalion
47	3488	52nd Engineer Battalion
48	635	759th Military Police
49	8000	Directorate of Logistics
50	342	Defense Reutilization and Marketing Office

Table 2-1 (continued)

Point No.	Bldg. No.	Operator
51	7804	Golf Course Maintenance Shop
52	9248	TSD Facility & 90-day Consolidation Point

Waste oil is accumulated in tanks (see Appendix E), which are pumped out when full. The pump operator tests the oil removed from the waste oil tanks using a Chlordetect method (for detection of chlorinated solvent constituents). Waste oil found clean of chlorinated compounds is transported to the Building 1399 Equalization Basin (Source 35), where the contents of the tank truck are allowed to settle prior to pumping. When settling has occurred, the water fraction is discharged to the equalization basin, and the waste oil fraction is containerized in waste oil bladders. The full waste oil bladders are contracted to an off-post disposal contractor. If waste oil contains detectable levels of chlorinated compounds, a sample is collected and submitted for analysis. If it is determined to be hazardous, the oil is properly containerized and labelled, and consigned to the DRMO for off-post disposal as a hazardous waste.

2.3.5 Pesticides and PCBs

Pesticides (insecticides, herbicides, rodenticides, and algaecides) have been used on Fort Carson to maintain grounds and structures. Pesticides are stored or used by the DEH Entomology Section, the DPCA Golf Course, Battalion Field Sanitation Teams, Fountain-Fort Carson School District, and the Post Exchange. Fort Carson has developed a Pest Management Plan, including information regarding handling, storage, and disposal of pesticides. The Pest Management Plan was not available during the document review.

One incident involving pesticides is reported in ESE, 1983. In August 1981, heavy rains caused flooding of Buildings 212 and T-204. ESE (1983) reported that the flood waters were

contaminated with chlordane (73.6 percent, 14 liters); diazinon (0.5 percent, 2 liters); malathion (57 percent, 15 liters); FICAM (1.0 percent, 1.8 kilograms); and sevin (50 percent, 0.5 kilograms). The report further states that, after the flood, water inside the curbed storage areas was placed in drums and retained as a hazardous waste. Mr. Bob Stone, current Supervisor (three year tenure) for Fort Carson's pest management plan, and a pesticide applicator for about 17 years, reports that no release of pesticides to the environment occurred as a result of this incident (Bob Stone, Fort Carson, personal communication, 1994).

A survey of in-service transformers has been conducted to identify transformers containing polychlorinated biphenyls (PCBs) using nameplate information. An analysis of dielectric fluid is conducted on transformers that are removed from service. Transformers containing PCBs have previously been removed by a hazardous waste contractor. There are no records of PCB spills.

2.3.6 Asbestos Surveys/Abatements

Mr. Nick Palotto is in charge of the asbestos survey and abatement program at Fort Carson. When renovation or building demolition projects are proposed, Mr. Palotto's office contracts a survey for asbestos and lead paint at the premises in question. If the results of the survey show that asbestos containing materials (ACM) and/or lead-based paint are present at the subject premises, abatement is performed by a contractor that is retained by Fort Carson on a yearly contract. The abatement contractor is responsible for proper containerizing and disposal of wastes generated during the abatement.

3.1.3

In 1990 and 1991, the U.S. Army Corps of Engineers contracted a survey of ACM at housing units on Fort Carson (EA Engineering, 1991). This report was not available during the document review. No other comprehensive surveys of ACM have been completed.

2.3.7 Radiological Materials

Radiological materials are stored or used by the 95th Service Company and other entities at Fort Carson. The 95th Service Company is a DARCOM detachment assigned to the 704th Maintenance Battalion and performs divisional Radiac calibration. The calibrators are licensed under Nuclear Regulatory Commission Byproduct Material License 29-01022-08, held by the U.S. Army Communications and Electronics Command. The calibrators are stored in Building 8000; also at Building 8000, unserviceable radioactive devices are stored prior to contracted off-site disposal. Disposal of all radiological materials is coordinated through the division's Radiological Protection Officer, who coordinates with Division Chemicals for disposal.

The radiological materials storage facility at Building 8000 is a secure facility, and is marked with warning signs. The area is subjected to periodic wipe tests, and radiation film badges are worn by personnel in the area. No problems were reported with either the monitoring of the storage area or exposure to personnel.

The use of radioactive isotopes at the hospital is confined to iodine-125. Waste iodine-125 liquid is discharged to the sanitary sewer. The total discharge to the sewer is less than 1 curie per year and is diluted to concentrations below the drinking water standard. Waste iodine-125 solids are decayed 10 half-lives in Building 8000 and then discarded in the sanitary landfill (ES&E, 1983).

2.3.8 Pinon Canyon Maneuver Site Operations

During the site visit to Fort Carson, ETA personnel were accompanied by Fort Carson and USAEC personnel for a site visit to PCMS. Operations at PCMS are conducted to conserve and protect environmental resources. No accidents having potential environmental impacts have been reported. No hazardous substances are stored or disposed of on-site. Sanitary refuse is collected at designated points, and hauled back to Fort Carson for disposal. Sewage treatment is conducted on-site, with the system consisting of four aerating ponds and a septic leach field. No routine vehicle maintenance activities are permitted on site. Waste generated from any required or emergency maintenance procedures is containerized and hauled back to Fort Carson.

Several underground storage tanks (USTs) have been excavated and replaced with aboveground storage tanks (ASTs). Reportedly, these tanks contain new product only, not waste oil or other waste substances. A spill of JP-4 (jet fuel) occurred during removal of one of the USTs, and soils have been excavated to remediate the contamination. Because POL is regulated under statutes other than CERCLA, it is not covered in this PA report.

The only known CERCLA substance used at PCMS is a herbicide, Hyval XL Sterilant. This product is used in quantities of about 30 gallons per 10 acres to suppress weed growth along railroad tracks. Application has been made every 2 or 3 years since 1983 or 1984, in accordance with product use guidelines.

2.3.9 CERCLA Sources

Under CERCLA, the EPA defines "source" as, "an area where a hazardous substance may have been deposited, stored, disposed, or placed". Also, soil that may have become contaminated as a result of hazardous substance migration is considered a source. In general, however, the volumes of air, groundwater, surface water, and stream sediments that may have become contaminated through migration are not considered sources. Constituents that are defined as hazardous substances, pollutants, or contaminants are listed in CERCLA Sections 101(14) and 101(33)(EPA, 1991). CERCLA, under the petroleum exclusion clause, eliminates petroleum products (crude oil or any fraction thereof) from consideration as contamination sources. Other exclusions under CERCLA include naturally occurring substances (e.g., radon), and biological wastes.

Each CERCLA source identified during the Fort Carson PA document review and site visit is described in the following section with a narrative description and a table showing analytical data, if available. Location of each source is plotted on Figure 2-2. Sources are identified by a sequential number, by name, and by the Fort Carson RMIS number in parenthesis. Photographs taken during the on-site visit are referenced under each source narrative description, and are compiled into a photo log in Appendix B. Sketches of the location of each source, prepared from available documents and/or during the site visit, are contained in Appendix C.

Source 1 - Landfill No. 1 (FTC 005)

This source is the active sanitary landfill at Fort Carson, comprising about 240 acres in T15S, R66W, Sections 28, 29, 32, and 33, southwest of the cantonment area. The landfill area is mostly fenced (six-foot chainlink), and is attended from 7:00 am to 3:30 pm, after which time the access gate is locked (Larry Reisinger, Fort Carson, personal communication, 1994). It has been used from 1973 to the present, and has received sanitary waste, construction debris (including asbestos), and sludges. A small impoundment for wastewater containing oil and grease was located in the southeastern corner of the landfill area. Sanitary wastes were originally placed into trenches oriented northwest to southeast along the southwestern side of the fenced landfill area, while the northeastern portion of the area was used for construction debris. The fenced, attended landfill area has been expanded to the northeast and sanitary wastes have been placed in southwest-northeast trenches in the northern portion of the landfill. Daily cover is provided, and when full, final cover is placed (cover depths unknown). The landfill is constructed in thin, unconsolidated colluvial and landslide deposits that overlie the Pierre Shale. Photograph No. 1 shows Landfill No. 1.

Ten monitoring wells surround the landfill, most of which are dry all year. Two of the monitoring wells may contain small amounts of leachate at some times during the year (USAEHA, 1992). Analytical data for this source are presented in Table 2-2.

Table 2-2. Landfill No. 1 Analytical Groundwater Data

Contaminant	Concentration (USAEHA, 1992)	Concentration (Rinehart, 1993)
benzene	0.003 mg/l	
1,2 dichloroethane	0.003 mg/l	
cis-1,2 dichloroethene	0.083 mg/l	
1,2 dichloropropane	0.017 mg/l	

Table 2-2 (continued)

Contaminant	Concentration (USAEHA, 1992)	Concentration (Rinehart, 1993)
perchloroethene	0.066 mg/l	
trichloroethene	0.140 mg/l	
bis (2-ethylhexyl)phthalate	0.023 mg/l	
phenol	0.060 mg/l	
2-methylphenol	0.006 mg/l	
di(ethylhexyl)phthalate	0.007 mg/l	
barium		0.039 mg/l
chromium		0.004 mg/l
cadmium		0.016 mg/l
lead		0.186 mg/l
silver		0.025 mg/l
mercury		0.0010 mg/l
arsenic		0.406 mg/l
selenium		0.644 mg/l
methylene chloride		0.055 mg/l

NOTE: Values in table reflect only data above detection limit. Blanks may indicate parameter was not detected or was not tested. Refer to Appendix F for full analytical data reports.

Source 2 - Landfill No. 2 (FTC 006)

This source is located along the hillside east of the cantonment area (T15S, R66W, Section 15). The approximately 140-acre landfill received sanitary waste, sludges, and waste petroleum, oil, and lubricants (POL) from 1960 until 1978. The easternmost portion of the landfill is reported to have received significant amounts of sludges (USAEHA, 1988b). A combined trench and area fill method was used at this landfill. The landfill area is fenced on all boundaries with 3-strand barbed wire to a height of approximately four feet; the access gate is locked at all times, but no attendant is present.

The landfill is constructed within thin unconsolidated colluvial and landslide deposits that overlie the Pierre Shale. At least the uppermost portion of the cover soil is composed of terrace alluvium material, and includes gravel and cobbles, some more than 10 inches in size. Depth of cover at this landfill is unknown.

In 1988, The U.S. Army Environmental Hygiene Agency (USAEHA) found that the southern portion of the landfill generates leachate. At times of high rainfall, leachate from this landfill has reportedly reached the Clover Ditch drainage system (USAEHA, 1988b).

Twenty-one monitoring wells have been installed in the vicinity of Landfill No. 2 (R. Noyes, Fort Carson, personal communication, 1994). Analysis of groundwater samples showed concentrations of metals, nitrates/nitrites, TCE, PCE, and other substances. Analytical data for Landfill No. 2 are shown in Table 2-3.

Table 2-3. Landfill No. 2 Analytical Groundwater Data

Contaminant	Concentration (USAEHA, 1988a)	Concentration (USAEHA, 1988b)	Concentration (ICF, 1991)	Concentration (USAEHA, 1992)	Concentration (Rinehart, 1993)
trichloroethene			0.0013 mg/l		
1,2 dichloropropane			0.00171 mg/l	0.002 mg/l	
perchloroethene			0.0012 mg/l		
acetone		0.053 mg/l	0.190 mg/l		
dichlorobenzene			0.00262 mg/l		
TPH			4.2 mg/l		
toluene			0.001 mg/l		
aluminum			220 mg/l		
antimony			0.140 mg/l		
cadmium		0.0008-0.0026 mg/l	0.0247 mg/l		0.008-0.021 mg/l
chromium	0.021-0.060 mg/l	0.001-0.225 mg/l	0.177 mg/l	0.845 mg/l	0.0017-0.0132 mg/l
cobalt			0.0506 mg/l		
iron	0.17-0.22 mg/l		416 mg/l	33.7 mg/l	
manganese	0.483-6.060 mg/l		7.7 mg/l		

Table 2-3 (continued)

Contaminant	Concentration (USAEHA, 1988a)	Concentration (USAEHA, 1988b)	Concentration (ICF, 1991)	Concentration (USAEHA, 1992)	Concentration (Rinehart, 1993)
boron			1.33 mg/l		
vanadium			0.348 mg/l		
selenium		0.01-0.19 mg/l	0.0506 mg/l	0.106 mg/l	0.380-2.67 mg/l
nitrates/nitrites	1.6-103 mg/l	3.4-350 mg/l	220 mg/l	180 mg/l	
silver	0.038-0.050 mg/l	0.02 mg/l		0.144 mg/l	0.012-0.026 mg/l
1,2 dichloroethane				0.002 mg/l	
barium		0.10-0.18 mg/l			0.006-0.132 mg/l
lead	0.140-0.520 mg/l	0.003-0.005 mg/l			0.091-0.229 mg/l
mercury	0.0002 mg/l				0.0001-0.0058 mg/l
arsenic					0.268-1.134 mg/l
copper	0.02-0.14 mg/l	0.01-0.02 mg/l			
zinc	0.12 mg/l	0.01-0.05 mg/l			
beryllium		0.008 mg/l			

Contaminant	Concentration (USAEHA, 1988a)	Concentration (USAEHA, 1988b)	Concentration (ICF, 1991)	Concentration (USAEHA, 1992)	Concentration (Rinehart, 1993)
1,1,2-trichloro-1,2,2-trifluoroethane					0.434-0.612 mg/l
methylene chloride					0.110-0.142 mg/l
2-butanone		0.027-0.074 mg/l			
bis(2-ethyl hexyl) phthalate		0.020-0.030 mg/l			
benzene		0.006-0.079 mg/l			
methyl t-butyl ether		0.009-0.370 mg/l			
C_4H_8 isomer		0.007 mg/l			

NOTE: Values in table reflect only data above detection limit. Blanks may indicate parameter was not detected or was not tested. Refer to Appendix F for full analytical data reports.

Source 3 - Landfill No. 3 (FTC 007)

This source is located northwest of Landfill No. 2 (T15S, R66W, Section 15), and was reported to have been used from 1957 until 1960 for disposal of sanitary wastes, sludges, and waste POL. The approximately 64-acre landfill has indistinct boundaries, and may have been a small, uncontrolled dumping area. No monitoring wells or analytical data exist at this source. The landfill is unfenced and unattended, and depth of cover is unknown. Landfill No. 3 is shown in Photograph No. 4.

Source 4 - Landfill No. 4 (FTC 008)

This landfill is located in the northern part of the cantonment area (T15S, R66W, Section 8), and was reportedly used for about 6 months during 1957 to receive sanitary waste and possibly small amounts of sludge and waste POL (USAEHA, 1988b). It is located on 14 acres just west of the DRMO. The landfill is reportedly located in an area of shallow water table in the Piney Creek Alluvium (tributary to the Fountain Creek alluvium). Buildings have subsequently been built over the former landfill, and three monitoring wells surround it. Total depth of cover at this landfill is unknown. Photograph No. 5 shows the location of Landfill No. 4, including the buildings now established on the surface of the landfill, and the drainage ditches along its boundaries.

Three groundwater monitoring wells are located near Landfill No. 4. Analytical data at this source show elevated concentrations of chromium (3.75 mg/l), and detectable concentrations of toluene (0.0002 mg/l) and styrene (0.0004 mg/l) in groundwater. Analytical data for Landfill No. 4 are presented in Table 2-4(a).

Table 2-4(a). Landfill No. 4 Analytical Groundwater Data

Contaminant	Concentration (USAEHA, 1988b)	Concentration (USAEHA, 1992)	Concentration (Rinehart, 1993)
barium	0.127 mg/l		0.023-0.159 mg/l
chromium	0.065 mg/l	3.75 mg/l	0.0021-0.158 mg/l
selenium	0.023 mg/l		0.379-0.907 mg/l
Nitrates/Nitrites	3.4 mg/l		
bis(2-ethylhexyl)phthalate	0.040 mg/l		
iron		7.42 mg/l	
silver		0.302 mg/l	0.0099-0.0278 mg/l
toluene		0.0002 mg/l	
styrene		0.0004 mg/l	
cadmium			0.0071-0.0175 mg/l
lead			0.109-0.208 mg/l
mercury			0.0001 mg/l
arsenic			0.96-3.70 mg/l

NOTE: Values in table reflect only data above detection limit. Blanks may indicate parameter was not detected or was not tested. Refer to Appendix F for full analytical data reports.

Table 2-4(b). Landfill No. 4 Surface Water Analytical Data

Contaminant	Concentration (Rinehart, 1993)
barium	upstream - 0.122 downstream - 0.132
chromium	upstream - 0.0162 downstream - 0.0054
cadmium	upstream - 0.0014 downstream - 0.0024
lead	upstream - 0.042 downstream - 0.062
silver	upstream - 0.0013 downstream - 0.0026
mercury	upstream - 0.0003 downstream - 0.0003
selenium	upstream - 0.971 downstream - 3.220
arsenic	upstream - 0.126 downstream - 0.117

Source 5 - Landfill No. 5 (FTC 009)

This source is located in the old horse and mule barn waste area in the northeast corner of the cantonment area (T15S, R66W, Section 10). The landfill was operated from 1946 until 1956, and received sanitary waste, construction debris, sludges, and waste POL. Building 8831 was constructed on the landfill and, during construction, some filled material was relocated within

the landfill (ES&E, 1983). Also during construction, friable asbestos reportedly was exposed (Fort Carson, 1992). The boundaries of the landfill are not well defined, and it was previously believed to be much smaller in size than the 26+ acres now reported. The landfill is located partially within the Piney Creek Alluvium, a shallow aquifer tributary to the Fountain Creek alluvium. The landfill is unfenced and unattended, and total depth of cover is unknown. Photograph No. 6 shows the location of Landfill No. 5.

Eight groundwater monitoring wells are located near Landfill No. 5. Analytical data for Landfill No. 5 are presented in Table 2-5(a).

Source 6 - Landfill No. 6 (FTC 010)

Source 6 is an approximately 64-acre landfill located in the cantonment area (T15S, R66W, Section 17) which was used from 1942 until 1946 to receive sanitary waste, construction debris, sludges, and waste POL. The trenches, visible as long depressions from two to three feet deep due to settling, are oriented southwest to northeast. The landfill is located in the Piney Creek alluvium, tributary to the Fountain Creek alluvium. The landfill is unfenced and unattended, and total depth of cover is unknown. Photograph No. 7 shows the location of Landfill No. 6.

Four groundwater monitoring wells are located near Landfill No. 6. Analytical data for Landfill No. 6 are presented in Table 2-6(a).

Source 7 - Landfill No. 7 (FTC 011)

This source is located southeast of the Fort Carson golf course in T15S, R66W, Section 29. The 32-acre landfill was used for disposal of construction debris from 1968 until 1978. Wastes were deposited at the headwall of a canyon. One monitoring well has been installed directly downgradient. Total depth of cover at the landfill is unknown, but some of the wastes are reportedly being exposed by erosion (USAEHA, 1988b). No analytical data are available for this source.

Table 2-5(a). Landfill No. 5 Analytical Groundwater Data

Contaminant	Concentration (USAEHA, 1988a)	Concentration (USAEHA, 1988b)	Concentration (ICF, 1991)	Concentration (USAEHA, 1992)	Concentration (Rinehart, 1993)
TPH			15.5 mg/		
aluminum			16 mg/l		
iron			16.7 mg/l	2.48 mg/l	
manganese	0.222-4.090 mg/l		2.01 mg/l		
boron			1.81 mg/l		
selenium		0.007-0.09 mg/l	0.128 mg/l	0.237 mg/l	0.070-0.959 mg/l
Nitrates/Nitrites	0.12-126 mg/l	18-490 mg/l	180 mg/l	330 mg/l	
chromium	0.022-0.046 mg/l	0.001-0.111 mg/l		0.910 mg/l	0.0034-0.0136
silver		0.020-0.037 mg/l		0.436 mg/l	0.0024-0.0404 mg/l
methylene chloride				0.0003 mg/l	
1,1 dichloroethane				0.0002 mg/l	

Table 2-5(a) (continued)

Contaminant	Concentration (USAEHA, 1988a)	Concentration (USAEHA, 1988b)	Concentration (ICF, 1991)	Concentration (USAEHA, 1992)	Concentration (Rinehart, 1993)
cis-1,2 dichloroethene				0.0006 mg/l	
trichloroethene			0.0049 mg/l	0.005 mg/l	
Bis(2-ethylhexyl)phthalate		0.09 mg/l		0.013 mg/l	
barium		0.092 mg/l			0.0278-0.3725 mg/l
cadmium		0.0023 mg/l			0.0037-0.0224 mg/l
lead	0.210-0.340 mg/l	0.066 mg/l			0.0514-0.6798 mg/l
mercury					0.0001-0.0104 mg/l
arsenic					0.078-2.890 mg/l

Table 2-5(a) (continued)

Contaminant	Concentration (USAEHA, 1988a)	Concentration (USAEHA, 1988b)	Concentration (ICF, 1991)	Concentration (USAEHA, 1992)	Concentration (Rinehart, 1993)
copper	0.031-0.037 mg/l	0.01 mg/l			
zinc	0.02-0.06 mg/l	0.01-0.03 mg/l			
nickel	0.11-0.12 mg/l				
thallium		0.1 mg/l			

NOTE: Values in table reflect only data above detection limit. Blanks may indicate parameter was not detected or was not tested. Refer to Appendix F for full analytical data reports.

Table 2-5(b). Landfill No. 5 Analytical Surface Water Data

Contaminant	Concentration (Rinehart, 1993)
barium	upstream - 0.1557 downstream - 0.1446
chromium	upstream - 0.0023 downstream - 0.0023
cadmium	upstream - 0.0055 downstream - 0.0066
lead	upstream - 0.0689 downstream - 0.0712
silver	upstream - 0.0072 downstream - 0.0084
mercury	upstream - 0.00082 downstream - 0.00049
selenium	upstream - 0.196 downstream - 0.196
arsenic	upstream - 0.204 downstream - 0.070

Table 2-6(a). Landfill No. 6 Analytical Groundwater Data

Contaminant	Concentration (USAEHA, 1988a)	Concentration (USAEHA, 1988b)	Concentration (USAEHA, 1992)	Concentration (Rinehart, 1993)
fluoride	1.6 mg/l			
manganese	1.53 mg/l			
barium		0.120 mg/l		0.078-0.141 mg/l
cadmium				0.0013-0.0082 mg/l
chromium		0.03 mg/l	0.325 mg/l	0.0086-0.0730 mg/l
lead		0.068 mg/l		0.041-0.096 mg/l
mercury				0.0001-0.0002 mg/l
selenium				0.0036-0.3060 mg/l
arsenic				0.011-0.212 mg/l
iron			6.04 mg/l	
silver			0.344 mg/l	0.0010-0.0111 mg/l
methylene chloride			0.0004 mg/l	

Table 2-6(a) (continued)

Contaminant	Concentration (USAEHA, 1988a)	Concentration (USAEHA, 1988b)	Concentration (USAEHA, 1992)	Concentration (Rinehart, 1993)
chloroform			0.0004 mg/l	
perchloroethene			0.017 mg/l	0.280 mg/l
trichloroethene			0.001 mg/l	
bis(2-ethlyhexyl)phthalate			0.470 mg/l	
phenol			0.028 mg/l	
di-n-butylphthalate			0.007 mg/l	

NOTE: Values in table reflect only data above detection limit. Blanks may indicate parameter was not detected or was not tested. Refer to Appendix F for full analytical data reports.

Table 2-6(b). Landfill No. 6 Analytical Surface Water Data

Contaminant	Concentration (Ft. Carson, 1994)
barium	upstream - 0.156 mg/l downstream - <0.006 mg/l
chromium	upstream - <0.0020 mg/l downstream - 0.0330 mg/l
cadmium	upstream - 0.0020 mg/l downstream - 0.0053 mg/l
lead	upstream - 0.035 mg/l downstream - 0.070 mg/l
silver	upstream - 0.0007 mg/l downstream - 0.0046 mg/l
mercury	upstream - 0.0002 mg/l downstream - <0.0001 mg/l
selenium	upstream - 0.0690 mg/l downstream - 0.0360 mg/l
arsenic	upstream - 0.127 mg/l downstream - 0.004 mg/l

Source 8 - Landfill No. 8 (FTC 012)

This 24-acre landfill is located northwest of Landfill No. 3 (T15S, R66W, Section 15), and received construction debris from 1972 to 1973 (B&V, 1993). Erosion has removed some of the cover (original and remaining depths unknown) and exposed construction debris. The

landfill is unfenced and unattended. No analytical data are available at this source. Photograph No. 8 shows the location of Landfill No. 8.

Source 9 - Landfill No. 9 (FTC 013)

This 24-acre landfill is located just south of the Senior Officer Family Housing Area (T15S, R66W, Section 28). The landfill is located immediately adjacent to an unnamed tributary to Fountain Creek, and may lie partly within the Piney Creek Alluvium (USAEHA, 1988b). During the site visit, concrete construction debris was observed in an exposed trench, and 105-mm shell casings (dummy rounds) were also noticed on the ground. The landfill is unfenced and unattended, and depth of cover is unknown. No analytical data are available for this source. Landfill No. 9 is shown in Photograph Nos. 9 and 10.

Source 10 - Landfill No. 10 (FTC 014)

This source is located alongside B Ditch, immediately southwest of O'Connell Boulevard and northeast of the concrete tank trail that parallels B Ditch (T15S, R66W, Section 9). Landfill area was estimated during the field visit at four to five acres. It reportedly received construction/demolition wastes over an unknown time of operation. Some debris (concrete, auto parts, asphalt) was visible on the surface. The landfill is unfenced and unattended, and total depth of cover is unknown. No analytical data are available for this source. Landfill No. 10 is shown Photograph No. 11.

Source 11 - Landfill No. 11 (FTC 015)

Landfill No. 11 is located east of the sewage treatment plant in the northeast corner of the northern impact area (T15S, R66W, Section 25). It lies immediately north of Clover Ditch, and about 800 feet west of Fountain Creek, encompassing about four acres in the Piney Creek Alluvium. Incinerator ash was buried in this location during its operational period, but dates of operation are not known (B&V, 1993).

During the site visit, some areas of grayish soil were noted. Surface depressions supporting different vegetation than surrounding areas were also observed (shorter, greener grass in

depressions in comparison to taller species on surrounding hillocks.) The landfill is unfenced and unattended, and total depth of cover is unknown. Photograph No. 12 shows the area of Landfill No. 11.

Four groundwater monitoring wells have been installed near this source; analytical data for Landfill No. 11 are shown in Table 2-7(a).

Source 12 - Landfill No. 12 (FTC 016)

This source is located approximately 3,000 feet north of the El Paso-Pueblo County Line, and 2,000 feet west of the installation boundary (T17S, R66W, Section 36), and is situated within alluvial deposits. The approximately 0.4-acre area was active in approximately 1982, and reportedly received vehicle parts and scrap metal (B&V, 1993). No debris was visible at the surface. During the field visit to this location, personnel observed three fence post markers and buried 105-mm shell casings marking the corners of a triangular area in the correct geographic location. These markers were assumed to delineate the landfill boundaries. No monitoring wells have been installed, and no analytical data are available at this source. The landfill is unfenced and unattended, and total depth of cover is unknown. Photograph No. 13 shows the location of Landfill No. 12, including the three fence posts marking the roughly triangular-shaped landfill.

Table 2-7(a). Landfill No. 11 Analytical Groundwater Data

Contaminant	Concentration (USAEHA, 1988b)	Concentration (USAEHA, 1992)	Concentration (Rinehart, 1993)
arsenic	0.001 mg/l		0.011-0.078 mg/l
barium	0.092 mg/l		0.078-0.208 mg/l
chromium			0.004-0.009 mg/l
cadmium			0.0027-0.0067 mg/l
lead			0.045-0.120 mg/l
mercury			0.0001 mg/l
selenium	0.034 mg/l	0.057 mg/l	0.050-0.182 mg/l
Nitrate/Nitrite	150 mg/l	40 mg/l	
acetone	0.02 mg/l		
bis(2-ethylhexyl)phthalate	0.03 mg/l	0.180 mg/l	
chromium		0.841 mg/l	
iron		4.64 mg/l	
silver		0.120 mg/l	0.0028-0.0090 mg/l
methylene chloride		0.0005 mg/l	0.246 mg/l
1,1,1 trichloroethane		0.004 mg/l	
phenol		0.210 mg/l	
2-nitrophenol		0.01 mg/l	
1,2-dichloroethane			0.042 mg/l

NOTE: Values in table reflect only data above detection limit. Blanks may indicate parameter was not detected or was not tested. Refer to Appendix F for full analytical data reports.

Table 2-7(b). Landfill No. 11 Analytical Surface Water Data

Contaminant	Concentration (Rinehart, 1993)
barium	upstream - 0.040 mg/l downstream - 0.036 mg/l
chromium	upstream - <0.002 mg/l downstream - <0.002 mg/l
cadmium	upstream - 0.0021 mg/l downstream - 0.0014 mg/l
lead	upstream - 0.030 mg/l downstream 0.028 mg/l
silver	upstream - 0.0014 mg/l downstream - 0.0032 mg/l
mercury	upstream - <0.0001 mg/l downstream - 0.0008 mg/l
selenium	upstream - <0.0004 mg/l downstream - 0.0178 mg/l
arsenic	upstream - 0.009 mg/l downstream - 0.011 mg/l

Source 13 - Pete's Hill Dump (FTC 026)

This construction debris landfill is located south of Landfill No. 7 and northwest of Landfill No. 1 in T15S, R66W, Section 29. Wastes have been deposited at the head of a canyon starting

prior to 1976, and the landfill is currently active. Initially, wastes were dumped over the headwall of the box canyon, and left uncovered. In June, 1988, site operators began applying clean soil (depth unknown) to cover the waste. During the site visit, exposed debris was visible on the open face of the landfill. Photograph No. 14 shows the location of Pete's Hill Dump, looking up the canyon toward the active face of the landfill.

The landfill is reportedly located in Pierre Shale, with terrace alluvium on high ground above the canyon (USAEHA, 1988b). The landfill is unfenced and unattended. No monitoring wells have been installed, and no analytical data are available.

Source 14 - Abandoned Open Dumping Area, Range 121 (FTC 040)

This source is located in Fort Carson's impact area in an arroyo in Range 121, approximately 4,000 feet north of Military Reservation Boundary Road, and 3,500 feet west of the installation boundary (T17S, R66W, Section 25). Total acreage of the open dumping area is unknown. Waste vehicle targets and open burn destruction debris were placed in a pit adjacent to an arroyo known as Young Hollow (USAEHA, 1985). Operations at this location commenced at an unknown time, and were ceased in 1990. Wastes deposited in this area include vehicle parts, ash, explosives, and possibly unexploded ordnance (UXO). Photograph No. 15 shows the Range 121 open dumping area. No analytical data are available for this source.

Source 15 - Abandoned Fire Training Storage Area (FTC 022)

This 30 foot by 30 foot fenced area was located at the south corner of the runway parking area of Butts Army Airfield (T16S, R66W, Section 10). Drums of flammable waste and off-specification fluids were stored here for use in fire training activities (B&V, 1993). This operation started in the 1970s and ceased in 1992. Although no sampling of stored wastes was performed, labels indicated storage of waste oil, waste fuels, kerosene, and TCE. Some soil staining near the drums was reported by B&V (1993), but was not observed during the site visit. No analytical data are available for this source.

Source 16 - DRMO Hazardous Waste Storage Area (FTC 024)

This source is the location of a former hazardous waste storage shed at the Defense Reutilization and Marketing Office (DRMO), in T15S, R66W, Section 8. Mr. William Tilley, Chief of the DRMO, was interviewed to gain information regarding this source. The area was used from 1958 until 1983, at which time the shed reportedly blew down during a windstorm, and a new facility was constructed. The shed was empty when it collapsed. The ground surface in the area is compacted dirt and gravel. No spills in the area were recalled. Mr. Tilley reported that up to 5,000 gallons of wastes were stored at the facility, mostly in containers holding five gallons or less. A few (less than 10) 55-gallon drums were also stored there.

The new facility constructed at this location (shed labelled N-07) is used to store excess product such as lube oils, paints, etc. No hazardous waste is stored in the new facility. No analytical data are available for this source. The new facility is shown in Photograph No. 16.

Source 17 - Hazardous Waste and PCB Storage Facility (FTC 025)

This source is located at Building 9248 (T15S, R66W, Section 33 and T16S, R66W, Section 4) and consists of a 30-foot by 60-foot bunker which used to be an ammunition storage facility, and four 90-day storage lockers. The building is now used for hazardous wastes, and has impervious, curbed floors. About 10,000 pounds per month of hazardous wastes are handled at the facility, and they are segregated according to compatibility class (flammables, toxins, polychlorinated biphenyls (PCBs), and pesticides) (Al Collar, Fort Carson, personal communication, 1994). This facility has been in operation since 1983, and operates under Generator Identification Number CO2210020150. This facility's application for a RCRA Part B Permit is still pending; no permit number has been assigned.

No potential for release of contamination to the environment is likely at this facility, due to the bermed, impervious floors which would allow spill containment and remediation prior to release. No analytical data are available pertaining to this source. The storage bunker (left background) and four 90-day storage lockers (middle background) are shown in Photograph No. 17. Hazardous wastes in storage at this facility during the site visit are presented in Appendix D.

Source 18 - Golf Course Holding Pond (FTC 036)

This pond is located between the sixth and eighth fairways on the Fort Carson golf course (T15S, R66W, Section 29) and acts as a retention pond for effluent from the installation sewage treatment plant (STP). The pond was constructed in approximately 1972, and is still in use. Prior to construction of the IWTP in 1981, the STP received wastes that were discharged to the sanitary sewer system at numerous points around the installation. Water from the pond is used for golf course irrigation, and as a reserve for fire fighting. The pond is shown in Photograph No. 18.

The pond was observed during the site visit, at which time a sulfur-like odor was noticed associated with the water, which has a greenish color. Treated sewage effluent enters the pond at the southeast corner, and the pond drains naturally on the east side to an unnamed natural watercourse. The greenskeeper, Mr. Emmanuel Thomas, was interviewed during the site visit. Mr. Thomas has been manager and grounds keeper for about 12 years, and reports that some frogs and other amphibians may live in and around the pond. No analytical data are available pertaining to this source.

Source 19 - Sewage Treatment Lagoons, Butts Army Airfield (FTC 039)

Two unlined lagoons at Butts Army Airfield (T16S, R66W, Section 10) have been operated since 1960, receiving surface drainage from the airfield, effluent from the oil/water separator of the fire training area (Source 28), and sanitary sewage. Liquids dewater in the lagoons by evaporation, and any overflow from the ponds would flow into an adjacent streambed, tributary to Rock Creek. Site personnel report that no overflow from the ponds has occurred (R. Noyes, Fort Carson, personal communication, 1994). Each lagoon has a surface area of approximately two acres. NPDES Permit CO-0021181 governs discharge from the ponds. The lagoons are adjacent to Source 28 (FTC 021), the Abandoned Fire Training Area, and may have received surface water drainage from that source. Photograph No. 19 shows the location of the sewage treatment lagoons. No analytical data are available pertaining to this source.

Source 20 - Directorate of Industrial Operations Hazardous Waste Storage Yard (FTC 043)

A 15-foot square corrugated metal storage shed was situated adjacent to Building 301 (T15S, R66W, Section 9), and was used to store hazardous waste from 1953 until 1981. Stored wastes included solvents in 55-gallon drums (B&V, 1993). The concrete floor reportedly had a drain which led to a nearby drainage.

During the site visit, three concrete pads, each about 20 feet square, with some visible staining were observed in the approximate location of the former storage shed. According to site personnel of short tenure (less than two years), the corrugated metal shed was removed prior to 1992. The three pads believed to be in the location of the former hazardous waste storage shed are shown in Photograph 20. No analytical data are available to characterize potential contamination at this source.

Source 21 - Drainage Ditches Adjacent to Building 301 (FTC 044)

These drainage ditches lie adjacent to Building 301 (T15S, R66W, Section 9), and received effluent from the wash rack and garage from 1950 until 1981 (B&V, 1993). USAEHA (1988a) reported that the ditches empty into an unnamed tributary of Fountain Creek. ES&E (1983) noted that the vehicle wash rack had a water recycling system and an oil/water separator, and that discharge from the washrack flowed to the sanitary sewer system. Photograph No. 21 shows the outfall to the unnamed drainage. During the field visit, a weathered-concrete vehicle wash rack was also observed, in an advanced state of disuse. Although oily wash water and garage waste discharged to these ditches may have contained hazardous constituents, no sampling or other characterization of potential contamination has been conducted.

Source 22 - STP Land Spreading Area, Landfill No. 1 (FTC 047)

This approximately two-acre field lies adjacent to Landfill No. 1 (T15S, R66W, Section 28) and has been in operation from the early 1980s until the present (B&V, 1993). Digested sewage sludge from the installation sewage treatment plant is spread over the area, and disced into the native soils. Photograph No. 22 shows the location of the STP sludge spreading area.

ES&E (1983) reported that, in Fort Carson's hazardous waste permit application, STP sludge was listed as an extraction procedure (EP) toxic waste. The ES&E report further states that the listing was based on EP toxicity test results for a single sludge sample, which showed 123 ppm of chromium. No analytical data (other than the single sludge sample) are available to characterize potential contamination at this source.

Source 23 - Abandoned EOD Demolition Area (FTC 048)

This EOD demolition area lies east of the cantonment area (T15S, R66W, Section 15) and was used from before 1957 until 1967. Site personnel estimate the area comprises approximately 5 acres, based on site visits and aerial photography interpretation (R. Noyes, Fort Carson, personal communication, 1994). It consists of a series of parallel trenches that were used to bury or detonate explosive duds. The area was difficult to locate definitively during the field visit, as no surface indications remain. No history was available regarding trench depth or dimensions. Clover Ditch flows adjacent to the trenches. Photograph No. 23 shows the location of this source.

Source 24 - Deactivated Trenches at Range 1 Open Burning Grounds (FTC 017)

This open burning ground is located just south of the cantonment area (T15S, R66W, Section 22) and was in operation from 1963 until 1993 (R. Noyes, Fort Carson, personal communication, 1994). It comprises four acres, with two trenches 100 feet long and 2 feet deep that were used to burn waste explosives and propellants. Wastes were placed in the trenches and burned. The location of the OB grounds at Range 1 is shown in Photograph No. 24.

Soil sample analysis conducted by USAEHA in 1985 (USAEHA, 1988a) revealed explosive compounds (TNT, DNT) have contaminated surface soils in the trenches, but analyses outside the trenches revealed no detectable contamination. Also, USAEHA (1988a) reported black soil stains and ash in the trenches. Three monitoring wells have been constructed at this location, but samples collected in November, 1993 showed no hazardous constituents in the groundwater

(R. Noyes, Fort Carson, personal communication, 1994). Analytical data for this source are presented in Table 2-8.

Table 2-8. Range 1 Open Burning Grounds Analytical Groundwater Data

Contaminant	Concentration (Rinehart, 1993)
barium	0.040-0.068 mg/l
chromium	0.008-0.013 mg/l
cadmium	0.014-0.017 mg/l
lead	0.160-0.179 mg/l
silver	0.023-0.028 mg/l
mercury	0.0003 mg/l
selenium	5.10-6.69 mg/l
arsenic	1.64-2.31 mg/l

Source 25 - Range 1A Abandoned Open Burning Grounds (FTC 018)

This burning pit is located at the intersection of Routes 9 and 11 (T17S, R67W, Section 2) and was in operation from 1963 until 1987. This pit was used for the burning of excess explosive propellant powder. The trenches measure 150 feet in length and lie parallel to Route 9. Photograph No. 25 shows the location of the former burning pit at Range 1A.

Little Turkey Creek lies downgradient of the source. Analytical data of soil samples taken by USAEHA in 1985 showed fuel oils, elevated levels of nitrogen, and a pyrene concentration of about one ppm.

Source 26 - Range 121 OB Grounds (FTC 019)

Range 121 is located approximately 13 miles south of the cantonment area in the Fort Carson impact area (T17S, R66W, Section 24) and has been in operation since 1963. A dry stream bed was used for open burning from 1963 to 1985, then the activity was moved to an adjacent, four-acre open area. Photograph No. 26 shows the general location of Range 121 open burning grounds. Small arms munitions are destroyed by surface detonation after being covered by high explosives. Munitions destroyed at this location include CS grenades, white phosphorus, flares, pyrotechnics, and smokes. Measurable amounts of RDX (up to 0.0086 mg/g) and high concentrations of nitrogen compounds were detected in soil samples at this source (USAEHA, 1985). No groundwater monitoring wells have been installed to characterize groundwater quality at this source.

Source 27 - Landfill Oil Lagoon (FTC 020)

This source is located north of Landfill No. 1 (T15S, R66W, Section 28) and was in operation from the 1960s to 1991. Wastes including solvents, sludge from the vehicle wash facility and sludge from the IWTP were buried in a trench measuring 100 x 60 x 8 feet. Photograph No. 27 shows the landfill oil lagoon.

Current investigations at the landfill oil lagoon have shown elevated PID readings to a depth of 17 feet. On 28 February 1992, the Colorado Department of Health (CDH) issued a Notice of Violation (NOV) to Fort Carson, including charges that one sample taken at the landfill oil lagoon contained cadmium, chromium, and lead.

The landfill oil lagoon is part of active Landfill No. 1. A number of monitoring wells have been installed in the vicinity. Analytical data from these wells are presented in Table 2-9. Soil data collected in 1994 showed total soil concentrations of a number of CERCLA-regulated substances, including metals, semi-volatiles, and VOCs (including benzene, TCE, and PCE). In 1990, Orion Laboratories' TCLP analyses of soil samples detected elevated levels of some heavy metals and semi-volatile compounds.

Table 2-9. Landfill Oil Lagoon Analytical Soil Data

Contaminant	Concentration (Orion Laboratories, 1990)[a]	Concentration (RUST,1994)[b]
arsenic	0.02 mg/l	3.7 mg/kg
antimony		7.0 mg/kg
beryllium		0.51 - 0.67 mg/kg
barium	7.7 - 49.2 mg/l	3.7 - 5.0 mg/kg
cadmium	0.008 - 1.6 mg/l	5.6 - 10.5 mg/kg
chromium	2.6 - 7.3 mg/l	16.9 -28.6 mg/kg
copper		37.1 - 87.0 mg/kg
lead	0.03 - 31.0 mg/l	87.9 - 313 mg/kg
mercury		0.12 - 0.56 mg/kg
nickel		12.0 - 18.2 mg/kg
silver		0.91 - 6.7 mg/kg
selenium	0.34 mg/l	0.19 -0.27 mg/kg
thallium		0.12 mg/kg
zinc		127 - 278 mg/kg
pentachlorophenol	>5.0 mg/l	
2,4,5-trichlorophenol	>2.0 mg/l	
2,4,6-trichlorophenol	37.7 mg/l	
p-cresol	33.7 mg/l	

Table 2-9 (continued)

Contaminant	Concentration (Orion Laboratories, 1990)[a]	Concentration (RUST,1994)[b]
phenanthrene		6.4 - 10 mg/kg
di-n-butyl phthalate		1.1 mg/kg
fluoranthene		1.2 - 2.7 mg/kg
pyrene		1.4 - 2.3 mg/kg
butyl benzyl phthalate		2.1 mg/kg
benzo(a)anthracene		1.4 mg/kg
bis(2-Ethylhexyl)phthalate		20 - 65 mg/kg
chrysene		1.8 mg/kg
di-n-octyl phthalate		1.2 - 2.3 mg/kg
benzo(a)pyrene		0.690 mg/kg
benzo(g,h,i)perylene		0.720 mg/kg
1,2-dichlorobenzene		5.1 mg/kg
napthalene		6.9 - 16 mg/kg
4-chloro-3-methylphenol		6.0 mg/kg
2-methylnapthalene		22 - 32 mg/kg
acenapthalene		1.5 mg/kg
dibenzofuran		1.2 - 1.6 mg/kg
fluorene		2.4 - 2.9 mg/kg

Contaminant	Concentration (Orion Laboratories, 1990)[a]	Concentration (RUST, 1994)[b]
acetone		0.300 mg/kg
benzene		0.380 mg/kg
1,2-dichloroethene		2.2 mg/kg
ethylbenzene		0.86 - 7.2 mg/kg
methylene chloride		0.24 - 0.42 mg/kg
perchloroethene		22.0 mg/kg
toluene		1.8 - 5.6 mg/kg
trichloroethene		3.9 mg/kg
xylenes		6.1 - 43 mg/kg

a - TCLP analyses of soil samples.

b - total soil concentrations.

NOTE: Values in table reflect only data above detection limit. Blanks may indicate parameter was not detected or was not tested. Refer to Appendix F for full analytical data reports.

Source 28 - Abandoned Fire Training Area (FTC 021)

This source is located at Butts Army Airfield just east of the sewage lagoons (T16S, R66W, Section 10). The facility was in operation since the 1960s, and was closed in December, 1993. In 1988, USAEHA reported that waste POL was stored on-site in open, damaged, and/or leaking

containers, and that soils surrounding these containers showed some staining (USAEHA, 1988a). This condition was not observed during the field visit.

In 1983, ESE reported approximately 100 5-gallon cans and several dozen 55-gallon drums of solvents, carbon remover, alcohol, and unidentified materials were observed to be dumped and/or stored in this area. Many containers were reportedly open, damaged, or leaking, and the ground surface reportedly showed evidence of contamination at that time. About every two weeks, waste combustibles (oils and solvents prior to 1990; fuels only from 1990 to 1993) were placed in a 60 x 60 x 2 foot cracked concrete basin and set on fire, to conduct fire training exercises (B&V, 1993). Prior to 1972, similar exercises were conducted in an unlined earthen pit in the same vicinity (ES&E, 1983). Water and fire retardant chemicals used to extinguish the fire have been infrequently routed to the adjacent sewage treatment lagoons (R. Noyes, Fort Carson, personal communication, 1994). Photograph No. 28 shows the fire training area.

Analysis of sludge samples taken at this source in July, 1991 by Fort Carson personnel indicated elevated levels of TPH (230,000 mg/kg), lead (0.62 mg/l), barium (2.5 mg/l), benzene (0.82 mg/l), PCE (0.8 mg/l), and TCE (3.0 mg/l). Also, stained soils were sampled, and removed in 1991.

Source 29 - Deactivated Trenches at Range 123 Open Burning Grounds (FTC 027)

This source is located in Range 123 (T18S, R67W, Section 33) and was in operation from 1983 to 1990, mostly by Air Force personnel. Practice bombs with diesel fuel and dunnage were burned in a trench that measures 50 x 12 x 5 feet. Residual ash, as well as practice bombs, targets, and vehicle parts, were collected every six months and deposited in an open dump in Range 121. Photograph No. 29 shows the Range 123 open burning grounds. No sampling or analytical data are available for this source.

Source 30 - Wash Rack Drainage Ditches (FTC 032)

These ditches are situated at vehicle wash racks adjacent to the Clover Ditch (T15S, R66W, Section 22), near Building 2940. They received runoff from vehicle washing until 1981 (B&V,

1993). In 1981, the IWTP was completed to eliminate discharges of oily wastewater. During the site visit, the Clover ditch carried a depth of 1 to 2 feet of water. Grading and drainage drawings provided by site personnel (drawing date 1966) indicate the ditches were not lined at that time, and no exit point for effluent is indicated.

Source 31 - Building 8030 Battery Shop (FTC 045A)

The battery shop at Building 8030 (T15S, R66W, Section 9) has been in operation since 1980. Activities conducted at this location include battery draining and filling, and acid neutralization. During the site visit, about 18 batteries were observed in the shop. A large floor drain is present, and the piping leading from it was recently replaced (a few months prior to the field visit) due to deterioration that resulted from acid corrosion. Also, discoloration and eroded concrete were observed on the floor of the shop. Site personnel had no information regarding exit points for the drain and piping; however, document review indicated that battery contents are dumped into the floor drain, routed to a holding tank where sodium bicarbonate is added to neutralize the acid, and effluent is drained to the sanitary sewer (B&V, 1993). Current practice is to ship spent batteries without draining the acid. Two 15-gallon plastic drums labelled as sulfuric acid were present on the day of the field visit: one drum was empty or nearly empty; the other was more than one-half full.

Source 32 - Building 8000 Battery Storage Area (FTC 045B)

New and used lead-acid batteries are stored, charged, filled, and re-shipped from the battery room at Building 8000 (T15S, R66W, Section 9). Battery acid neutralization has been conducted at this location since 1972. Waste solids are collected and transported to the DRMO. Some waste solids may have been dumped near the fence at this location (B&V, 1993). Site personnel reported that, on the average, about 144 batteries are charged and returned each day. No accidents, explosions, or spills were recalled.

The acid neutralization chamber at the battery shop was previously used to process acid drained from spent batteries, using sodium bicarbonate as a neutralizing agent. Effluent from the

chamber used to be discharged to the IWTP. Under current practices, however, acid is not drained prior to shipping.

During the site visit, approximately 800 to 1,000 batteries were stored outside at this location, awaiting shipping (Photograph No. 30). Batteries are stacked on wooden pallets on a concrete pad. Some staining and corrosion of the concrete was observed.

Source 33 - Building 8142 Battery Area (FTC 045C)

An acid neutralization process was conducted in Building 8142 (T15S, R66W, Section 9) from 1978 to 1992. Acid from batteries was drained into a holding tank and neutralized using sodium bicarbonate. Liquid effluent was discharged into the sanitary sewer and solid waste was discarded to a dumpster. This operation was ceased in 1992; at about the same time, site personnel report that the pipeline leading from the floor drain was corroded and leaking. The pipeline was excavated and replaced. Current practice at this location is to store batteries only until they can be shipped to Building 8000 for further disposition. During the site visit, about 70 to 80 batteries were observed in storage at this location.

Source 34 - Building 8000 Activities: Former Vapor Degreaser (FTC 058) and Former Waste Oil/Solvent USTs (FTC 054)

The largest industrial operation under DIO is the consolidated maintenance facility at Building 8000 (T15S, R66W, Section 9). The facility services wheeled and tracked vehicles and is equipped to perform complete vehicle overhauls, including engine and transmission rebuilding and repair. The operation reportedly has produced over 2,600 gallons per month of waste oil and over 200 gallons per month of waste solvents.

A solvent vapor degreasing and cleaning facility was located in Building 8000 which resulted in release of chlorinated solvent contamination to the surrounding soils, and potentially to the groundwater. Approximately 150 gallons per month of spent TCE solvent was generated at this facility. The date the operation began is unknown, but the facility stopped using chlorinated solvents in the system in 1992, replacing them with alkaline cleaner (GeoGuard 2215, potassium

hydroxide) for the degreasing operation. Soils surrounding the sump that received spent solvent from the vapor chambers was found to be contaminated with TCE and PCE. Also, sampling conducted through one drill hole 10 to 12 inches beneath the floor near the vapor chambers found contaminated soils with TCA at concentrations up to 2,000 ppm (B&V, 1993). A second drill hole about 24 feet away from the sump found no contamination.

Two USTs (26,000-gallon capacity) were used to store waste solvents generated at the degreasing operation in Building 8000, and waste from a parkerizing metal finishing process over the period 1971 to 1977 (ES&E, 1983). Dates of installation of the tanks are unknown; they were excavated and removed in 1993. Photograph No. 31 shows the location of the former USTs. Contaminated soils were also excavated when the tanks were pulled. Analytical results for 14 groundwater samples and 5 soil samples detected TPH in soil and benzene, TCE, and TCA in groundwater (B&V, 1993). A pump-and-treat groundwater remediation system has been installed to remediate contaminated groundwater at this location.

Other wastes generated at Building 8000 include about 100 gallons per month of caustic solution from the radiator shop, and about 1 pound per year of asbestos dust from brake pad grinding.

Source 35 - Equalization Basin, Building No. 1399 (No FTC Number)

About 50 feet south of Building 1399 (T15S, R66W, Section 16) is a bermed holding pond used to collect oily waste from oil/water separators, vehicle maintenance bays, wash facilities, and other activities around the installation. The asphalt-lined pond is about 90 feet square and about 12 feet in total depth, and it is underlain by three feet of clay soil. Immediately to the south of this basin is an unnamed drainage, tributary to Fountain Creek. The equalization basin is shown in Photograph Nos. 32 and 33.

Prior to 1991, analytical data collected by Fort Carson personnel indicated that sludge from this facility contained hazardous constituents (reactive sulfide, 1400 mg/kg; TCA, 35 mg/kg). In August 1991, the CDH issued a NOV to Fort Carson, charging that the sludge contained hazardous constituents, including sulfides (1400 mg/kg), TCA (35 mg/kg), DCA (0.69 mg/kg),

and toluene (0.68 mg/kg). The NOV further states that the asphalt liner has obvious cracks, and that the facility constitutes a hazardous waste surface impoundment.

In 1981, heavy rainstorms reportedly flushed oily waste out of the equalization basin and into the adjacent drainage (ES&E, 1983). Oily waste overflow from this facility, the Minick St. pump station, and the IWTP equalization basin was discharged into Fountain Creek during the flooding, and was subsequently taken into an irrigation ditch that diverts from Fountain Creek.

Source 36 - Range 123, New Demolition Area (No FTC Number)

This source comprises three recently-excavated trenches at Range 123 (T18S, R67W, Section 33) where waste explosives are burned as a training requirement. The trenches at Range 123 measure approximately 12 feet by 60 feet, and are shown in Photograph No. 34. No further information was available regarding activities or history at this area.

Source 37 - Soils at Former Waste Paint and Solvent UST near Building 201 (FTC 070)

A 500-gallon UST was used at Building 201 over the period 1960 through 1992 to receive waste paints and solvents (R. Noyes, Fort Carson, written communication, 1994). The UST was excavated and removed in 1994. Soil samples collected by Fort Carson personnel after the tank was removed in January, 1994 showed detectable concentrations of DCA (5.37 mg/l), chloroform (0.005 mg/l), and methylene chloride (0.006 - 2.79 mg/l), as well as petroleum hydrocarbons.

Source 38 - Administrative Services Division Printing Shop, Building 6120

Administrative Services Division operated an offset lithography printing shop in Building 6120 (T15S, R66W, Section 20). The print shop was originally in another nearby building, and was moved to Building 6120 in 1980. No information is available regarding the building number or exact location of the earlier print shop. From about 1958 until 1992, printing operations were conducted, utilizing petroleum-based blanket wash solution, PCE, methylene chloride, benzene, and an electrostatic etching solution containing cyanide. Site personnel estimate that about 20 gallons per week of hazardous substances were used, and that 15 to 20 gallons per month of

waste was generated. Since 1992, only photostatic reproduction activities have been conducted at this location.

Waste disposal practices at this source have varied over the time that the facility has been in operation. Site personnel reported that electrostatic solutions containing cyanide and other water-soluble wastes were poured down sinks and toilets until about 1985 (R. Walker, Fort Carson, personal communication, 1994). Spent solvents were generally containerized and deposited in dumpsters (R. Walker, Fort Carson, personal communication, 1994). However, review of documents indicated that, prior to 1976, these wastes were not containerized, but were "poured on top of waste paper in trash cans" (ES&E, 1983).

Source 39 - Golf Course Area Application of STP Sludge and Effluent

The Fort Carson golf course was used to spread sludge from the STP prior to 1984 (ES&E, 1983). Exact dates of land application of STP sludge are unknown, but the activity is reported to have ceased before 1984. The sludge mixed with STP effluent was transported via a permanent pipeline to the golf course, and sprayed evenly at a rate of 1,800 gallons each year over an area of about 200 acres.

Effluent from the STP has been used to irrigate the golf course since prior to 1972. In 1972, the Golf Course Holding Pond (Source 18, FTC 036) was constructed to impound STP effluent for irrigation and fire fighting purposes. Prior to construction of the IWTP in 1981, the STP received all wastes discharged to the sanitary sewer system, and hazardous constituents may have passed through to the effluent.

2.3.10 Non-CERCLA Sources

A number of activities at Fort Carson involve handling of substances not regulated under CERCLA. For example, incinerators of biological wastes at the old hospital, and probable radon in buildings are not considered under CERCLA. CERCLA also specifically excludes petroleum or petroleum-derived products. Practices at Fort Carson regarding handling, storage,

and disposal of non-CERCLA regulated substances are not addressed in this PA. A list of USTs and ASTs which contain POL is included in Appendix E, for reference purposes.

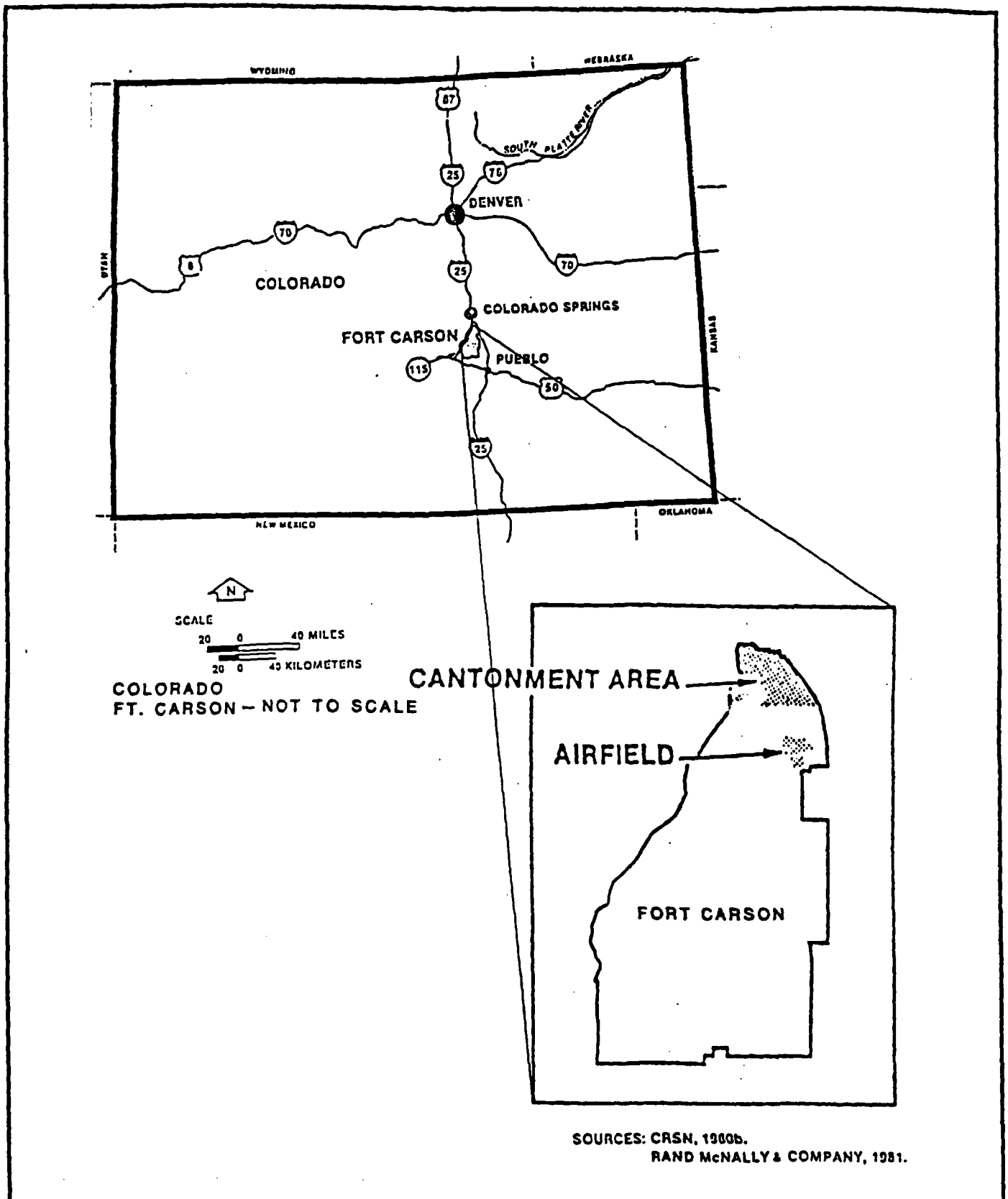

Figure 2-1
General Location Map, Fort Carson, Colorado

ENGINEERING TECHNOLOGIES ASSOCIATES, INC.
165 SOUTH UNION BLVD. SUITE 710
LAKEWOOD, COLORADO 80228
(303) 988-4957

FORT CARSON, COLORADO CERCLA SOURCE LOCATION MAP FIGURE 2-2

LEGEND

● 22 **Source Location and Number**

Fort Carson Military Reservation Boundary

Wetlands Boundary

Wildlife Habitat Location

(Note: copies of original oversize map can be requested from the U.S. Army Environmental Center Technical Information Center)

3.0 GROUNDWATER PATHWAY

3.1 Hydrogeologic Setting

Groundwater at Fort Carson occurs in shallow alluvial and sedimentary bedrock aquifers. Alluvial aquifers are discontinuous and consist of unconsolidated sediments deposited along existing stream valleys and drainage basins. Sedimentary bedrock aquifers consist of laterally continuous sandstones of the Dakota/Purgatoire aquifer and the underlying Fountain aquifer. Alluvial deposits are hydraulically disconnected from bedrock aquifers due to the presence of thick shale aquitards. Depth to water in the uppermost aquifer may be as shallow as five feet in the alluvial deposits. No karst features or aquifers occur at Fort Carson. The generalized geology at Fort Carson, including the distribution of major aquifers, is provided in Figure 3-1. A geologic cross-section across the central portion of Fort Carson is provided in Figure 3-2. The hydrologic properties of geologic materials at Fort Carson are summarized in Table 3-1.

3.1.1 Alluvial Aquifers

Deposits of stream alluvium at Fort Carson are found along Little Fountain, Rock, and Sand Creeks, as well as several unnamed tributary streams. Less significant alluvial deposits are found along Red and Turkey Creeks. Alluvial aquifers are found primarily in the northern (cantonment) and eastern portions of Fort Carson, and are generally absent in the southern and western portion of the property where sedimentary bedrock is exposed at the surface (Figure 3-1). Alluvial aquifers are unconfined, laterally discontinuous, and generally transmit small to moderate quantities of water to wells. Groundwater within the alluvium generally flows eastward toward the confluence with Fountain Creek east of Fort Carson. The alluvial aquifers at Fort Carson are hydraulically connected to the Fountain Valley alluvial aquifer immediately east of Fort Carson.

The most productive and transmissive alluvial aquifer at Fort Carson is found along Little Fountain and Rock Creeks where well yields up to 170 gallons per minute (gpm) have been reported. The alluvial aquifer in this area is reported to be up to 60 feet thick and consists

primarily of coarse sand and gravel. Groundwater within the Little Fountain Creek alluvium is reported to be flowing eastward under an average hydraulic gradient of 0.015 (Leonard, 1984).

Stream terraces occur in the areas between stream valleys, and are capped by poorly sorted older alluvial deposits up to 100 feet thick. The terrace alluvium is generally dry, but may transmit small quantities of water along the contact with the underlying Pierre Shale and younger stream alluvium.

Residual and/or alluvial soils up to 35 feet thick are present overlying bedrock in many areas of Fort Carson. Residual soils are derived from the in-place weathering of bedrock. Alluvial soils are present on the slopes of old stream terraces where they were deposited by sheetwash, landslides, or similar erosional processes. These soils are discontinuous and generally dry, but may locally contain significant quantities of groundwater. In the cantonment area, several landfills are located on the flanks of old stream terraces within residual and alluvial soils containing groundwater (e.g., Landfill No. 2). Groundwater within the residual/alluvial soils may be in hydraulic communication with adjacent alluvial valley aquifers.

The quality of water from the alluvial aquifers in the western portion of Fort Carson is generally acceptable for most intended uses. General water quality deteriorates eastward across Fort Carson, and is generally only suitable for irrigation and non-potable uses. Concentrations of fluoride locally exceed drinking water standards in the Little Fountain and Rock Creek alluvial aquifers (Leonard, 1984).

3.1.2 Sedimentary Bedrock Aquifers

Sedimentary rocks of Late Paleozoic and Mesozoic age are exposed at the surface in the western and southern portion of Fort Carson (Figure 3-1). This general sequence of rocks is expressed as a discontinuous series of north-south trending hogback ridges and troughs which parallel the Colorado Front Range from the Wyoming border to just south of Canon City. The stratigraphic sequence of geologic materials at Fort Carson is summarized in Table 3-1.

Eonothem and Erathem	System	Series	Geologic Unit	Thickness (feet)	Physical Characteristics	Hydrologic Properties
Cenozoic	Quaternary	Holocene	Landslide Deposits		Debris fans and earth flows on steep slopes.	Generally dry; may transmit infiltrated precipitation to underlying deposits.
			Stream Alluvium	0-60	Poorly sorted deposits of clay, silt, sand, gravel, cobbles, and boulders partly filling the valleys of present streams.	Yields small to large quantities of water to wells.
		Pleistocene	Terrace Deposits	0-100	Poorly sorted alluvial deposits of clay, silt, sand, and gravel on terraces above and between present stream valleys.	Generally dry; transmits small quantities of water to springs along contact with Pierre Shale and to stream alluvium.
Mesozoic	Cretaceous	Upper Cretaceous	Pierre Shale	3,000-5,000	Dark gray marine shale and bentonite. Sandy transition zone in upper 400 to 600 feet.	These units generally do not yield water to wells. Combined, they tend to retard vertical movement of water from the Dakota-Purgatoire aquifer, producing artesian conditions. In some areas, sandy or fractured zones provide small yields to wells. The quality of water from these units generally is unsuitable for most uses.
			Niobrara Formation	550-600	Smoky Hill Shale Member: 500+ feet of yellowish-brown soft, thin-bedded, calcareous shale interbedded with thin layers of limestone. Fort Hays Limestone Member: 3 to 40 feet of gray, hard, thin- to thick-bedded limestone.	
			Carlile Shale	150	Juan Lopez Member: Grayish-brown, hard calcarenite. Codell Sandstone Member: Yellowish-gray, thin to massive bedded sandstone. Blue Hill Shale Member: Dark gray, noncalcareous shale. Fairport Chalky Shale Member: Yellowish-gray, soft calcareous shale.	
			Greenhorn Limestone	75	Bridge Creek Limestone Member: Interbedded gray limestone and shale. Hartland Shale Member: Gray shaly calcarenite. Lincoln Limestone Member: Grayish-brown, hard calcarenite, shaly calcarenite, and bentonite.	
			Graneros Shale	75	Dark gray, hard calcareous shale.	
		Lower Cretaceous	Dakota Sandstone	90-110	Yellowish-brown, fine- to medium-grained, cross-bedded massive sandstone, locally coarse-grained to conglomeratic, with a middle unit of thin-bedded clay, sand, and shale.	The Dakota Sandstone and Lytle Sandstone Member of the Purgatoire Formation form the Dakota-Purgatoire aquifer. This aquifer is capable of yielding 5 to 10 gal/min to wells in most areas; yields of 150 to 200 gal/min to wells can be expected in areas where the permeability of the aquifer is enhanced by fractures.
			Purgatoire Formation	160-210	Glencairn Shale Member: 60 to 80 feet of dark colored shale and thin-bedded sandstone. Lytle Sandstone Member: 100 to 130 feet of light colored, fine-grained, massive bedded sandstone.	
	Jurassic	Upper Jurassic	Morrison Formation	225	Varicolored gray, maroon, and green siltstone and claystone interbedded with thin beds of sandstone, limestone, and conglomerate.	Not considered to be aquifers because of negligible permeability.
	Triassic		Lykins Formation	180	Varicolored maroon, green, and pink interbedded shale, siltstone, sandstone, and limestone.	
Paleozoic	Permian		Lyons Sandstone	700-800	Red to yellowish-gray, fine-grained sandstone.	Wells yield less than 10 gal/min. Developed mostly for domestic livestock water in outcrop areas where Dakota-Purgatoire aquifer has been removed by erosion.
	Pennsylvanian	Upper and Middle Pennsylvanian	Fountain Formation	2,100-2,900	Red, maroon, and brown irregularly bedded, coarse- to fine-grained, arkosic sandstone and conglomerate interbedded with siltstone and shale. Glen Eyrie Shale Member: Basal, gray sandstone, sandy shale, and black shale about 100 feet thick.	

Table 3-1. Physical and Hydrologic Properties of Geologic Units at Fort Carson, Colorado

Source: Leonard, 1984

The most potentially productive and areally extensive aquifer at Fort Carson is the Dakota/Purgatoire aquifer. The Dakota/Purgatoire aquifer consists of the Dakota Sandstone and the Lytle Sandstone Member of the Purgatoire Formation. The combined thickness of the sandstones is 150 to 220 feet. The Dakota Sandstone is separated from the Lytle Sandstone by 60 to 80 feet of marine shale and thin-bedded sandstone of the Glencairn Shale Member of the Purgatoire Formation. The Pierre Shale, Niobrara Formation, Carlile Shale, Greenhorn Limestone, and Graneros Shale overlie the aquifer and act as confining layers that retard vertical flow and produce artesian conditions. Groundwater generally flows in the direction of dip of the Formation. Groundwater in the Dakota/Purgatoire aquifer flows in a southeasterly direction across the southern portion of Fort Carson, and in a more easterly direction in the northern portion.

Wells at Fort Carson producing from the Dakota/Purgatoire aquifer have yields ranging from 30 to 230 gpm. Well yields increase substantially along the flanks of anticlines where permeability is enhanced by fracturing (Leonard, 1984).

Groundwater from bedrock wells is not used for potable supply at Fort Carson. Groundwater from the Dakota/Purgatoire aquifer characteristically contains elevated concentrations of radium-226, gross alpha, and other radiochemical constituents. Concentrations of these constituents are commonly above primary or secondary drinking water standards. The source of radioactive constituents is naturally-occurring uranium minerals contained within the Dakota Sandstone. Other chemical constituents that locally exceed drinking water standards include total dissolved solids (TDS), iron, manganese, and sulfate.

A second bedrock aquifer of local importance at Fort Carson is the Fountain aquifer. Wells produce water from the Fountain aquifer only in the western portion of Fort Carson where the more productive Dakota/Purgatoire aquifer has been removed by erosion. The Fountain aquifer consists of up to 2,900 feet of predominately poorly sorted maroon sandstone and conglomerate of the Fountain Formation. The permeability of the aquifer is relatively low due to cementation and poor sorting. The Lyons Sandstone overlies the Fountain Formation and consists of well

cemented fine-grained sandstone. The Lyons Sandstone is sometimes perforated by wells and included as part of the Fountain aquifer. The shales, siltstones and limestones of the overlying Lykins and Morrison Formations act as confining beds and retard upward flow from the aquifer. Groundwater in the Fountain aquifer flows toward the south and east in the general direction of formation dip. Wells at Fort Carson completed in the Fountain aquifer have small yields ranging from 1 to 10 gpm.

Groundwater from the Fountain aquifer is of generally acceptable quality. Locally, concentrations of TDS, selenium, fluoride, iron, manganese, sulfate and gross alpha and beta radiation may exceed primary or secondary drinking water standards.

3.1.3 Background Groundwater Quality

Background groundwater quality at Fort Carson was estimated from analytical data obtained from well W6-3 located northwest of Landfill No. 6 (Rinehart, 1993). These data included results for VOCs and heavy metals. Well W6-3 is located upgradient and outside of the landfill proper. Because there are no potential sources or industrial areas upgradient of Landfill No. 6, groundwater quality at this location is assumed to represent "natural" conditions. Additional information concerning regional groundwater quality is presented in Leonard (1984). Analytical data obtained from well W6-3 identified elevated concentrations (above MCLs) of some heavy metals, including cadmium (0.007 mg/l), selenium (0.3060 mg/l), and arsenic (0.212 mg/l). Elevated concentrations of selenium may be derived from sediments of the Fountain Formation (Leonard, 1984).

3.2 Suspected Releases to Groundwater

Groundwater quality data are available from over 100 monitoring wells present at Fort Carson. Many of these wells have been sampled for hazardous constituents and, at certain locations, the presence of hazardous substances in groundwater has been confirmed. Suspected releases to groundwater include areas where CERCLA substances have been identified in groundwater

and/or other information suggests a probable release of CERCLA substances to groundwater has occurred.

Suspected releases to groundwater have occurred at six locations at Fort Carson. These areas are discussed separately below.

3.2.1 Source 2 - Landfill No. 2

Previous investigations at Landfill No. 2 have documented elevated concentrations of VOC's (including PCE and TCE), heavy metals, petroleum hydrocarbons, nitrate/nitrite, total organic carbon (TOC), and chemical oxygen demand (COD) in groundwater samples (see Table 2-3). Direction of groundwater flow at this location is predominantly south, until the alluvial valley aquifer is encountered, where the predominant groundwater flow direction coincides with the east-flowing surface channel, toward Fountain Creek. Migration of landfill leachate toward the alluvial valley aquifer has been documented (USAEHA, 1992; ICF, 1991). The presence of certain hazardous substances in groundwater, and the hydraulic connection of groundwater at the landfill with the alluvial valley aquifer constitute a suspected release to the groundwater pathway.

3.2.2 Source 4 - Landfill No. 4

Previous investigations at Landfill No. 4 have documented low concentrations of toluene, styrene, heavy metals, nitrates/nitrites and other compounds in groundwater samples. Landfill No. 4 is located within an alluvial valley aquifer, a tributary of the Fountain Creek aquifer. The presence of certain hazardous substances in the alluvial valley aquifer constitutes a suspected release to the groundwater pathway.

3.2.3 Source 5 - Landfill No. 5

Previous investigations at Landfill No. 5 have documented elevated concentrations of certain VOCs (including TCE and 1,2-DCE), heavy metals, petroleum hydrocarbons, and nitrate/nitrite in groundwater samples (see Table 2-5) (USAEHA, 1988a; USAEHA, 1988b; ICF, 1991; USAEHA, 1992; Rinehart, 1993). Landfill No. 5 is located partially within an alluvial valley aquifer adjacent to Clover Ditch. The presence of certain hazardous substances in groundwater

of the alluvial valley aquifer at this location constitutes a suspected release to the groundwater pathway.

3.2.4 Source 6 - Landfill No. 6

Previous investigations at Landfill No. 6 have documented elevated concentrations of certain VOC's (including PCE and TCE), and heavy metals in groundwater samples (see Table 2-6) (USAEHA, 1988a; USAEHA, 1988b; USAEHA, 1992; Rinehart, 1993). Landfill No. 6 is located within an alluvial valley aquifer. The presence of certain hazardous substances in groundwater of the alluvial valley aquifer at this location constitutes a suspected release to the groundwater pathway.

3.2.5 Source 11 - Landfill No. 11

Previous investigations at Landfill No. 11 have documented elevated concentrations of certain VOC's (including TCA), semi-volatile compounds, heavy metals, and nitrate/nitrite in groundwater samples (see Table 2-7) (USAEHA, 1988b; USAEHA, 1992; Rinehart, 1993). Landfill No. 11 is located within an alluvial valley aquifer immediately north of Clover Ditch and about 800 feet west of Fountain Creek. The presence of certain hazardous substances in groundwater of the alluvial valley aquifer at this location constitutes a suspected release to the groundwater pathway.

3.2.6 Source 34 - Former UST/Vapor Degreaser, Bldg. 8000/8001

Previous investigations at building 8000/8001 have documented elevated concentrations of certain VOC's (including PCE, TCA, and benzene) and petroleum hydrocarbons in groundwater samples (USAEHA, 1988a; USAEHA, 1988b; USAEHA, 1992). The source of the groundwater contamination appears to be a former leaking 26,000 gallon UST located adjacent to building 8001, and associated vapor degreaser located inside of building 8000. The area is located within an alluvial valley aquifer. The presence of certain hazardous substances in groundwater of the alluvial valley aquifer at this location constitutes a suspected release to the groundwater pathway.

3.3 Groundwater Targets

Fort Carson derives its potable water from the City of Colorado Springs (CCS), purchasing over 900 million gallons each year. The total population drinking water from CCS is approximately 200,000, including Fort Carson residents and workers. The CCS derives its water from several sources:

- locally, from tributaries of the Arkansas River (Fountain Creek and others);
- via transmountain diversions from the western side of the Continental Divide; and
- groundwater wells.

The Lower Fountain Water Quality Management Association (LFWQMA) comprises the CCS and four other water providers, which are:

- Stratmoor Hills Water District (SHWD);
- Security Water and Sanitation District (SWSD);
- Widefield Homes Water Company (WHWC); and
- the City of Fountain.

Although water systems of the members of the LFWQMA are separate and independent, each water provider is connected to its nearest neighbor via an emergency water line (Robert Schrader, SWSD, personal communication, 1994). In addition, all members purchase some of their water supply from Fry/Ark.

SHWD is located directly north of Fort Carson, and provides potable water to the Stratmoor community of approximately 13,932 residents (Elmer Wohlborg, SHWD, personal communication, 1994). SHWD derives its potable water from three wells northeast of Fort Carson along Route 85, and from Fry/Ark. The SHWD wells range in depth from 37 to 80 feet. Water quality at the wells is sampled quarterly, as required by CDH; the wells are also sampled regularly by representatives of the Schlage Lock Company to determine if a documented release of PCE at Schlage's plant has affected water quality at SHWD's wells.

SWSD is located east of Fort Carson, and provides potable water to approximately 12,451 residents (Robert Schrader, SWSD, personal communication, 1994). SWSD derives its water supply from 16 wells east of Route 85, and from Fry/Ark. One of the wells has been decommissioned due to PCE contamination in the Widefield Aquifer originating at the Schlage Lock Company plant.

Southeast of the SWSD, along Route 85, is the WHWC, serving approximately 8,500 residents (Ronald Snoddy, WHWC, personal communication, 1994). WHWC derives its potable water supply from three wellfields and from Fry/Ark. One wellfield lies along Route 85, west of the Town of Widefield; a second lies east of the Little Johnson Reservoir; and a third lies east of Widefield along the Fountain Ditch. WHWC's wells range in depth from 53 to 83 feet, and four wells have been decommissioned due to PCE contamination originating at the Schlage plant.

Further south along Route 85 is the City of Fountain, which provides potable water to a population of approximately 8,500 residents. Fountain derives its water supply from four wells completed in the Widefield Aquifer, and from Fry/Ark. To supplement its groundwater entitlements, Fountain holds water rights in Keeton Reservoir along Route 115 on the western boundary of Fort Carson. Fountain also diverts streamflow from Little Fountain Creek upstream of Fort Carson, and brings the water via pipeline to the Fountain Creek mainstem, where it is discharged to augment Fountain's municipal supply wells. (Ron Woolsey, City of Fountain, personal communication, 1994).

Two smaller water districts are located along the western boundary of Fort Carson, the Rock Creek Mesa Water District (RCMWD) and the Red Rock Water District (RRWD). RCMWD provides potable water to about 800 residences, and purchases the water supply from Mr. John May of the May Museum (Forrest Carter, RCMWD, personal communication 1994). John May has ten production wells, each approximately 25 feet deep, on his approximately 1,000-acre ranch. In addition to water sold to RCMWD, the wells are used to provide potable water to a campground that operates from 1 May through 1 October each year. Mr. May also diverts

surface water from Rock Creek into an unnamed reservoir to supplement water supply available at the wells (John May, May Museum, personal communication, 1994).

CCS's Pike's Peak and Monument Creek intakes are upstream, beyond the boundaries of the Fort Carson study area. The Pinello Ranch wellfield is approximately one mile east of Source 5, Landfill No. 5. The Pinello Ranch wellfield is used very infrequently to supplement CCS's water supply from other sources (Lamar Burch, CCS, personal communication, 1994).

About one mile northeast of Source 11, Landfill No. 11, is a neighborhood of about 20 private residences not serviced by any municipal water supply system. Review of information provided by the Colorado Division of Water Resources (Division of Water Resources, 1994) indicated that, at distances 1/2 mile or less from Landfill No. 11, at least nine wells have been permitted in the Fountain Creek alluvial aquifer for domestic and/or municipal (potable) uses. Total depth of these wells ranges from 30 to 66 feet. The exact location of these wells is not possible to determine from the information available (1/4-Section coordinates, in most cases). Although distance from Landfill 11 to these wells is not great, they are all located upgradient from Landfill 11.

Other uses of groundwater in the Fort Carson vicinity includes agriculture (irrigation), industry, and power generation. No wellhead protection areas have been designated on Fort Carson, or by other entities in the vicinity.

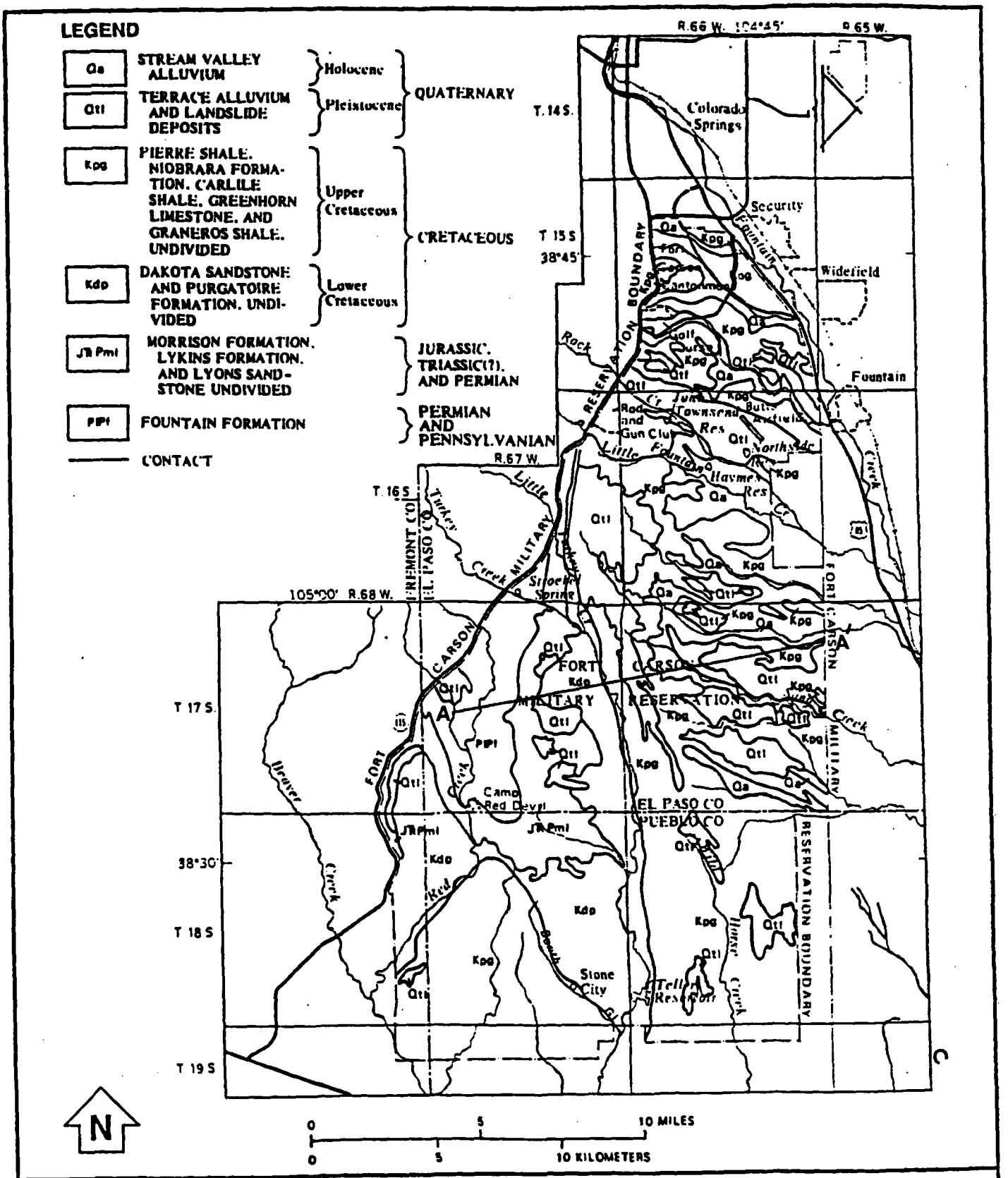

Figure 3-1
Generalized Geology of Fort Carson, Colorado

Source: Leonard, 1984

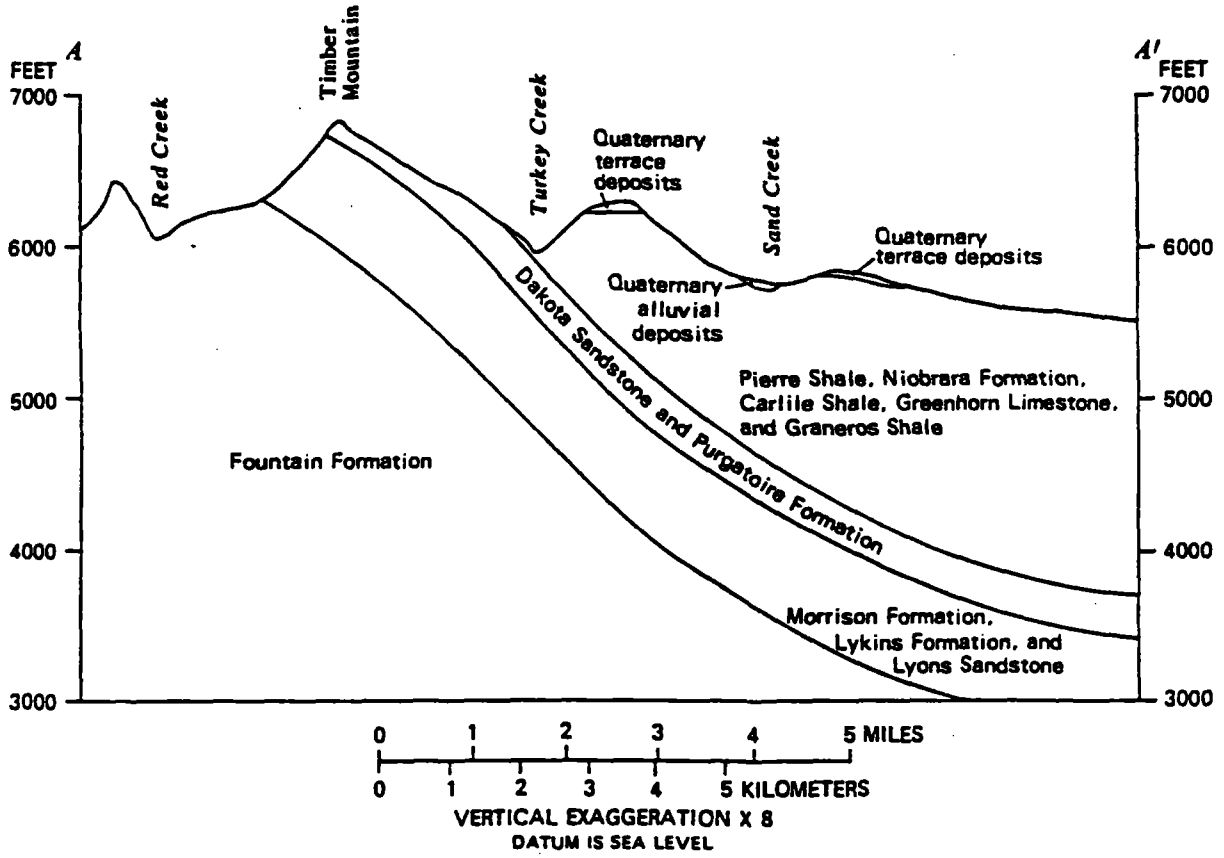

Figure 3-2

Geologic Cross Section of Fort Carson

Source: Leonard, 1984

4.0 SURFACE WATER PATHWAY

4.1 Hydrologic Setting

4.1.1 Streamflow

All of the streams entering and originating on Fort Carson are ephemeral (Leonard, 1984). Streamflow at Fort Carson mostly consists of runoff from precipitation, with a lesser contribution from groundwater seepage. The uneven occurrence of precipitation results in uneven annual and monthly quantities of streamflow. For long periods during the year, no flow occurs in most reaches of the streams. Continuous flow in Turkey Creek downstream from Teller Reservoir results from groundwater seepage near the southeast abutment of the reservoir. Groundwater seepage also results in continuous flow in Rock Creek immediately upstream from the eastern boundary of Fort Carson.

Streamflow is diverted for municipal water supplies by the city of Fountain from Little Fountain Creek upstream of Fort Carson. Water is taken through a pipeline, and carried to the mainstem of Fountain Creek, where it is discharged to the Fountain Creek alluvium to supplement the groundwater supply at the City of Fountain's municipal wells. Historically, streamflow was diverted from Little Fountain, Rock, and Turkey Creeks for irrigation.

Drainage on Fort Carson is from west to east, and most of the streams on the installation (i.e., those not intercepted by reservoirs) empty into Fountain Creek. Fountain Creek, a tributary of the Arkansas River, flows roughly parallel to the eastern boundary of Fort Carson. Fountain Creek is a perennial stream, with average annual streamflow of about 11 cubic feet per second (cfs). Most of Fort Carson lies outside any designated floodplain boundary. The 100-year floodplain boundary generally follows the major Fountain Creek tributary drainageways across the installation.

4.1.2 Reservoirs

Regulation of streamflow with reservoirs allows for a more even and dependable supply of water downstream. Five reservoirs have been constructed on Fort Carson, including Eureka Reservoir on Sand Creek; Haymes Reservoir supplied by Rock Creek; John Townsend Reservoir supplied by Little Fountain and Rock Creeks; North Side Reservoir supplied by Rock Creek; and Teller Reservoir on Turkey Creek. The USGS (Leonard, 1984) estimated reservoir evaporation loss at Fort Carson to be 38 inches per year.

4.1.3 Ditches and Canals

Major ditches draining on-site and off-site watersheds are the B Ditch, the Clover Ditch, and the I Ditch. Before Fort Carson existed as a military reservation, an irrigation ditch traversed from Fountain Creek through the present cantonment area and returned to Fountain Creek. This irrigation ditch was called the Clover Ditch. B Ditch is predominantly a natural drainageway running from Highway 115 to I-25. Portions of this ditch are a conversion of the original Clover Ditch channel. I Ditch also coincides with portions of the original Clover Ditch location. The modern-day Clover Ditch parallels I Ditch and intercepts runoff from the west and carries it south to Cheyenne Mountain Reservoir. Modern-day Clover Ditch does not incorporate any of the original irrigation ditch channel (Higginbotham & Associates, 1976). Major drainage basins and ditches are shown on Figure 4-1.

4.1.4 Surface Water Quality

Leonard (1984) presents an in-depth discussion of general water quality in streams and alluvial aquifers on and in the vicinity of Fort Carson. Water quality analyses presented in that report indicated that water from most of the streams and the alluvial aquifers along the western side of Fort Carson is suitable for irrigation and would be suitable for drinking if treated for biological contaminants. The report further concludes that the chemical quality of water from streams and the alluvial aquifers deteriorates to the east, but that water is still suitable for irrigation with proper management practices. Surface water quality analytical data are presented in the Leonard, 1984 report, including general water quality parameters, heavy metals, and

radiochemical parameters. Water quality samples were taken at various locations above, on, and below Fort Carson.

Background surface water quality at Fort Carson was estimated from analytical data obtained from the B-ditch located upstream of Landfill No. 6, and an unnamed ditch upstream of Landfill No. 4 (Rinehart, 1993). These data provided results of surface water sampling for VOCs and heavy metals. Because there are no potential sources or industrial areas upstream of these locations, surface water quality at these locations is assumed to represent "natural" conditions. Additional information concerning regional surface water quality is presented in Leonard (1984). Analytical data obtained from the upstream surface water locations identified elevated concentrations (above MCLs) of some heavy metals, including selenium (0.0690 to 0.971 mg/l) and arsenic (0.126 to 0.140 mg/l). Elevated concentrations of selenium may be derived from sediments of the Fountain Formation (Leonard, 1984).

4.2 Suspected Releases to Surface Water

There are four sites at Fort Carson where analytical data or other information suggest that releases of CERCLA substances to surface water may have occurred. Each of these sites is discussed separately below.

4.2.1 Source 2 - Landfill No. 2 (FTC 006)

Information presented in USAEHA (1988b) indicates that "at times of rainfall, runoff will carry diluted leachate into the Clover Ditch drainage system", a tributary to Fountain Creek. In addition, shallow groundwater at the landfill appears to be hydraulically connected to the adjacent alluvial valley aquifer. The Clover Ditch receives baseflow from the alluvial aquifer, and therefore has the potential to receive contaminated groundwater identified at the landfill. Based on these data, Landfill No. 2 is a source of a suspected release to the surface water pathway.

4.2.2 Landfill No. 11 (FTC 015)

Previous studies at Landfill No. 11 have documented various CERCLA compounds in groundwater samples collected at this location (see Table 2-7). Landfill No. 11 is located immediately north of Clover Ditch and about 800 feet west of Fountain Creek, within the alluvial aquifer. The Clover Ditch and Fountain Creek receive baseflow from the alluvial aquifer at this location (i.e., surface and groundwater are hydraulically connected), and therefore, the potential exists for contaminated groundwater at Landfill No. 11 to migrate into Clover Ditch and/or Fountain Creek. Based on this information, Landfill No. 11 is a source of a suspected release to the surface water pathway.

4.2.3 Source 35 - Equalization Basin, Building No. 1399 (No FTC Number)

In 1981, a rainstorm reportedly flushed oily waste out of the equalization basin into the adjacent unnamed ditch, and ultimately into Fountain Creek (see source description, Section 2.3.9). Sludges collected from this basin were later identified as containing hazardous constituents. Because the material flushed into the drainage may have contained CERCLA substances, the equalization basin is a source of a suspected release to the surface water pathway.

4.2.4 Source 18 - Golf Course Holding Pond (FTC 036)

The golf course holding pond currently receives waste water effluent from the STP. Prior to the construction of the IWTP in 1981, the STP received sanitary and industrial waste water from various sources on the installation, including waste streams that contained certain hazardous substances (see source description, Section 2.3.9). Because the holding pond may have received STP effluent containing CERCLA substances prior to 1981, the golf course holding pond is the source of a suspected release to the surface water pathway.

4.3 Surface Water Targets

More than 100 surface water intakes are located within a 15-mile target distance limit of Fort Carson (Division of Water Resources, 1994). These intakes are located along Fountain Creek

east of Fort Carson. None of the intakes are used for drinking water supply (Phillip Saletta, CCS, personal communication, 1994).

The distance from the probable point-of-entry (PPE) to a surface water body is approximately 100 feet (the probable point-of-entry is located along Clover Ditch adjacent to Landfill No. 11, Source 11). The nearest surface water intake is about 1200 feet from the PPE, and is used for agricultural purposes.

Fountain Creek and Teller Reservoirs are cold water fisheries used for recreational fishing. Food production rates are not available for these water bodies.

Wetland environments are found within the 15-mile target distance of Fort Carson. The locations of these areas are shown on Figure 2-2.

Habitat of two threatened aquatic species occurs within the Fountain Creek drainage: the Arkansas darter and the greenback cutthroat trout (Colorado Department of Wildlife, telephone communication, 1994). The greenback cutthroat trout has been noted in Lytle, Duck, and Little Turkey Creek Ponds, and in Turkey Creek. The Arkansas darter has been observed in Lytle Pond, Cottonwood and Mary Ellen Ranch Springs, and in Turkey Creek. The Arkansas darter may also be found in the 15-mile downstream reach of Fountain Creek, but no written documentation to that effect was located. A list of threatened and endangered species that have been observed on and near Fort Carson is presented in Table 4-1.

Table 4-1. Threatened and Endangered Species List, Fort Carson

Species Name	Listing Status
Bald Eagle (*Haliaeetus leucocephalus*)	federal endangered; Colorado endangered; winter transient
Peregrine Falcon (*Falco peregrinus anatum*)	federal endangered; Colorado endangered; forages on Fort Carson from aerie west of installation boundary
Greenback Cutthroat Trout (*Oncorhynchus clarki stomias*)	federal threatened; Colorado threatened; noted in Lytle, Duck, and Little Turkey Creek ponds, and in Turkey Creek
Mexican Spotted Owl (*Strix occidentalis lucida*)	federal threatened; found as road kill on Hwy 115 at Rock Creek crossing; nests west of Fort Carson boundary
Arkansas Darter (*Etheostoma cragini*)	federal category 1; Colorado threatened; noted in Lytle Pond, Cottonwood and Mary Ellen Ranch Springs, and Turkey Creek

Source: Fort Carson, written communication, 1994.

Figure 4-1. Surface Drainage, Fort Carson, Colorado

Source: Higginbotham & Associates, and Others (1976).

Approx. Scale: 1" = 3,300 feet

5.0 SOIL EXPOSURE AND AIR PATHWAY

The soil exposure pathway assesses the threat to human health and the environment by direct exposure to hazardous substances and areas of suspected contamination. This pathway differs from the three migration pathways in that it accounts for contact with in-place hazardous substances at the site, rather than migration of substances from the site (EPA, 1991).

The principal threat under the air pathway is the threat of airborne releases of hazardous substances. Evaluating likelihood of release requires hypothesis of whether hazardous substances are likely to be migrating from the site to the air (EPA, 1991).

5.1 Physical Conditions

Soils at Fort Carson consist of relatively young soil types which developed on alluvial sediments and residual soils found on sandstones and shale. Eight mapping units consisting of soils having similar engineering characteristics have been identified at Fort Carson (ES&E, 1983). They vary from poorly-graded, gravelly sands to stony and clayey silts. Turkey Creek, which runs through the center of the reservation from northwest to southeast divides the soils into two major regimes. The soils on the west side of the creek are primarily coarse-grained, shallow, granular soils of medium to high permeability, with scattered areas of low permeability clay-silt mixtures and loamy sands. Fine-grained silt and clay mixtures of low permeabilities, interspersed with low permeability loamy sands, predominate on the east side of Turkey Creek. Infiltration rates of soils at Fort Carson may range from 0.2 to 50.8 cm/hr (ES&E, 1983).

5.2 Likelihood of Exposure to Soil Contamination

Likelihood of exposure relates to areas of suspected contamination, and takes into account soils as well as any sources, areas of contamination, or other material on the surface (e.g., gravel fill, waste pile, plank flooring, concrete, asphalt paving) (EPA, 1991). The guidance presented in EPA, 1991 for evaluating this category states that, "To confidently rule out the presence of areas

of suspected contamination, appropriate quality analytical data demonstrating the absence of hazardous substances are generally necessary."

During the PA investigation, 39 sources of contamination were identified on Fort Carson (see Section 2). Likelihood of exposure to contaminants at each of these 39 sources was considered. Based on the definitions and discussion presented in EPA (1991), 37 of the 39 sources are considered to have likelihood of exposure. Section 2.3.8 of this report describes the 39 CERCLA sources identified at Fort Carson. Source 17 (Hazardous Waste and PCB Storage Facility, FTC 025), and Source 34 (Building 8000 Activities: Former Vapor Degreaser and Former Waste Oil/Solvent USTs, FTC 058 and FTC 054) are the two sources that have no likelihood of exposure. Each of these two sources is described below.

5.2.1 Source 17 - Hazardous Waste and PCB Storage Facility (FTC 025)

The hazardous waste and PCB storage facility at Building 9248 is used to store hazardous wastes for up to 90 days prior to off-post hauling by a disposal contractor. The facility has chemically-impervious, curbed floors, which would allow spill containment and remediation prior to environmental exposure. Hazardous wastes stored here are segregated according to compatibility class, and the building interior is temperature and ventilation controlled. No potential for release of contamination to the environment is likely at this location.

5.2.2 Source 34 - Building 8000 Activities: Former Vapor Degreaser (FTC 058) and Former Waste Oil/Solvent USTs (FTC 054)

Although soil contamination has been documented around the sump at the vapor degreaser in Building 8000, contaminated soils are covered by the concrete floor of the building. The impervious flooring prevents the likelihood of exposure at this source. The other area of concern at this source is the former waste oil/solvent USTs. These USTs were removed in 1993, and contaminated soils were excavated. The excavation was backfilled with clean soil, as shown in Photograph No. 31. There is no likelihood of exposure at this source.

5.3 Soil Exposure Targets

Soil exposure targets include threats to resident and worker populations within 200 feet of a potential source of soil contamination, as well as threats to sensitive terrestrial environments.

5.3.1 Resident/Worker Populations

No resident populations were identified within 200 feet of any potential source of soil contamination, and no schools or day-care facilities exist within the 200-foot radii. However, populations of workers and regularly-occupied buildings were identified for some sources. Table 5-1 presents information regarding these targets for soil exposure.

Table 5-1. Soil Exposure Targets - On-Site Workers

Source Number and Name	No. of Workers within 200 ft	Distance to Nearest Building
Source 1 - Landfill No. 1	< 10	> 200 ft
Source 4 - Landfill No. 4	about 25	0 ft
Source 5 - Landfill No. 5	about 75	0 ft
Source 16 - DRMO Hazardous Waste Storage Area	about 10	50 ft
Source 18 - Golf Course Holding Pond	4	50 ft
Source 20 - DIO Hazardous Waste Storage Yard	< 10	25 ft
Source 21 - Drainage Ditches Adjacent to Bldg. 301	< 10	75 ft
Source 22 - STP Land Spreading Area, Landfill No. 1	< 10	> 200 ft
Source 30 - Wash Rack Drainage Ditches	0	150-200 ft
Source 31 - Building 8030 Battery Shop	150	0 ft
Source 32 - Building 8000 Battery Storage Area	200	0 ft

Table 5-1 (continued)

Source Number and Name	No. of Workers within 200 ft	Distance to Nearest Building
Source 33 - Building 8142 Battery Area	150	0 ft
Source 35 - Equalization Basin, Building 1399	0	150 ft
Source 37 - Soils at Former Waste Paint and Solvent UST near Building 201	< 10	25 ft
Source 38 - Administrative Services Division Printing Shop, Building 6120	< 10	0 ft
Source 39 - Golf Course Area Application of STP Sludge and Effluent	4	50 ft

Note: Sources not listed in Table 5-1 have: a) no potential for soil contamination; or b) no workers or regularly-occupied buildings within 200 feet.

5.3.2 Nearby Population Targets

Within the 4-mile radius of Fort Carson, over 229,000 people are estimated to be resident. This is based on the report from Claritas (1994), and on information provided by Fort Carson personnel regarding resident/worker populations on the installation (R. Noyes, written communication, 1994).

5.3.3 Sensitive Terrestrial Environments

A number of federal- and state-listed threatened or endangered terrestrial species have been documented on and in the vicinity of Fort Carson (see Table 4-1). These species include peregrine falcon, Mexican spotted owl, and bald eagle. These species may frequent the Fort Carson area to forage, and bald eagles are considered transient winter residents, but permanent habitats within base boundaries have not been documented.

5.4 Likelihood of Release to the Air Pathway

Likelihood of release to the air pathway is evaluated based on site and pathway conditions, and considers whether a release of contamination to the air could be detected (i.e., not whether or not a release may have occurred). Because of rapid dispersion of released substances in the atmosphere, an air release can usually only be detected while it is occurring. At Fort Carson, the air pathway was judged to have no suspected release. The basis for this conclusion is that the CERCLA substances and activities documented at Fort Carson are not likely to release contamination to the air; furthermore, any releases that may occur would be transient (i.e., a limited-duration burning or fire-training activity) and no contamination would be likely to be detected during sampling.

5.5 Air Pathway Targets

Target populations under the air pathway consist of people who reside, work, or go to school within the four-mile target distance limit around the site. PA air pathway targets also include sensitive environments and resources.

Based on the Claritas report (Claritas, 1994), target populations within the pertinent distance radii were calculated. Total populations within the 1 to 1/4 mile; 1/4 to 1/2 mile; 1/2 to 1 mile; 1 to 2 mile; 2 to 3 mile; and 3 to 4 mile radii of Fort Carson are shown in Block 10 of the PA Assessment Forms (Appendix A).

A number of federal- and state-listed threatened, endangered, and sensitive species have been documented on and in the vicinity of Fort Carson (see Table 4-1). These species include peregrine falcon, Mexican spotted owl, and bald eagle. These species may frequent the Fort Carson area to forage, and bald eagles are considered transient winter residents, but permanent habitats within base boundaries have not been documented.

Another sensitive environment that constitutes a target for the air pathway is the Pike National Forest, abutting Fort Carson to the west. The National Forest is used for numerous recreational activities, including hunting, fishing, camping, hiking, rock climbing, swimming, skiing, and other outdoor sports.

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

A total of 39 potential CERCLA sources were identified at Fort Carson as part of this PA. Six sources were identified with suspected releases of CERCLA substances to the groundwater pathway. Four sources were identified with suspected releases to the surface water pathway. Thirty seven sources were identified with some likelihood of soil exposure to CERCLA substances; two sources were identified with no likelihood of soil exposure. There is no evidence of a suspected release to the air pathway.

Although suspected releases to the groundwater pathway have been documented, the relatively low concentrations of CERCLA substances observed at these locations, in conjunction with a limited migration potential and the relatively large distance to receptor locations, leads to the conclusion that observed groundwater contamination at Fort Carson presently poses limited risk to human health or the environment. There is no evidence to indicate that groundwater contamination has migrated beyond the boundaries of Fort Carson.

Suspected releases to the surface water pathway at Fort Carson have generally been of a sporadic nature (accidental release of substances during floods or high rainfall) and of low quantity, or are suspected due to interconnections with lightly contaminated groundwater. For these reasons, there is little risk to human health or the environment posed by suspected surface water contamination.

6.2 Recommendations

Many of the sources identified at Fort Carson have no analytical data to confirm the presence (or absence) of hazardous substances in soil or groundwater. At other locations, the amount of analytical data is not sufficient to establish the extent of soil and/or groundwater contamination (e.g. Landfill No. 2, Landfill No. 11, Building 8000). At certain locations, such as building

8000 and the landfill oil lagoon, remedial actions are presently underway. Soil and/or groundwater sampling should be conducted at these locations to document the absence or presence of hazardous substances, and to define the extent of contamination where it has already been identified.

Surface water and sediment sampling should be conducted at the four locations where suspected releases to surface water have been identified.

7.0 REFERENCES

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APPENDIX A

POTENTIAL HAZARDOUS WASTE SITE PRELIMINARY ASSESSMENT FORMS

OMB Approval Number: 2050-0095
Approved for Use Through: 1/92

EPA Potential Hazardous Waste Site Preliminary Assessment Form

Identification

State: CO | CERCLIS Number: CO2210020150

CERCLIS Discovery Date:

1. General Site Information

Name: HQ, Fort Carson & 4th Infantry

Street Address: Division (Mech), Fort Carson, CO

City: Colorado Springs | State: CO | Zip Code: 80913 | County: El Paso | Co. Code: | Cong. Dist:

Latitude: 38° 45' __.__" Longitude: 104° 47' __.__"

Approximate Area of Site: 138,000 Acres; 6.0×10^9 Square Ft

Status of Site:
- ☒ Active
- ☐ Inactive
- ☐ Not Specified
- ☐ NA (GW plume, etc.)

2. Owner/Operator Information

Owner	Operator
Department of Defense	US Army
Street Address: Same as No. 1	Street Address: Same as No. 1
City:	City: Colorado Springs
State: Zip Code: Telephone: ( )	State: CO Zip Code: 80913 Telephone: (719) 526-2022

Type of Ownership:
- ☐ Private
- ☒ Federal Agency — Name DOD
- ☐ State
- ☐ Indian
- ☐ County
- ☐ Municipal
- ☐ Not Specified
- ☐ Other

How Initially Identified:
- ☐ Citizen Complaint
- ☐ PA Petition
- ☐ State/Local Program
- ☐ RCRA/CERCLA Notification
- ☒ Federal Program
- ☐ Incidental
- ☐ Not Specified
- ☐ Other

3. Site Evaluator Information

Name of Evaluator: Isobel McGowan | Agency/Organization: Engineering Tech. | Date Prepared: 4-25-94

Street Address: 165 S. Union Blvd, Ste 710 | City: Lakewood | State: CO

Name of EPA or State Agency Contact: Marshall P. Fischer — Fed. Facilities site assessment Mgr.

Street Address: US EPA Region VIII 999 18th St., Ste 500

City: Denver | State: CO | Telephone: (303) 294-7147

4. Site Disposition (for EPA use only)

Emergency Response/Removal Assessment Recommendation:
- ☐ Yes
- ☐ No
- Date: _____

CERCLIS Recommendation:
- ☐ Higher Priority SI
- ☐ Lower Priority SI
- ☐ NFRAP
- ☐ RCRA
- ☐ Other
- Date: _____

Signature:

Name (typed):

Position:

EPA **Potential Hazardous Waste Site**
Preliminary Assessment Form - Page 2 of 4

CERCLIS Number: CO2210020150

5. General Site Characteristics

Predominant Land Uses Within 1 Mile of Site (check all that apply):

- ☒ Industrial
- ☒ Commercial
- ☒ Residential
- ☒ Forest/Fields
- ☒ Agriculture
- ☐ Mining
- ☒ DOD
- ☐ DOE
- ☐ DOI
- ☐ Other Federal Facility
- ☐ Other _____

Site Setting:

- ☒ Urban
- ☐ Suburban
- ☐ Rural

Years of Operation:

Beginning Year: 1942

Ending Year: current

☐ Unknown

Type of Site Operations (check all that apply):

- ☐ Manufacturing (must check subcategory)
  - ☐ Lumber and Wood Products
  - ☐ Inorganic Chemicals
  - ☐ Plastic and/or Rubber Products
  - ☐ Paints, Varnishes
  - ☐ Industrial Organic Chemicals
  - ☐ Agricultural Chemicals (e.g., pesticides, fertilizers)
  - ☐ Miscellaneous Chemical Products (e.g., adhesives, explosives, ink)
  - ☐ Primary Metals
  - ☐ Metal Coating, Plating, Engraving
  - ☐ Metal Forging, Stamping
  - ☐ Fabricated Structural Metal Products
  - ☐ Electronic Equipment
  - ☐ Other Manufacturing
- ☐ Mining
  - ☐ Metals
  - ☐ Coal
  - ☐ Oil and Gas
  - ☐ Non-metallic Minerals
- ☐ Retail
- ☐ Recycling
- ☐ Junk/Salvage Yard
- ☐ Municipal Landfill
- ☐ Other Landfill
- ☒ DOD
- ☐ DOE
- ☐ DOI
- ☐ Other Federal Facility _____
- ☐ RCRA
  - ☐ Treatment, Storage, or Disposal
  - ☐ Large Quantity Generator
  - ☐ Small Quantity Generator
  - ☐ Subtitle D
    - ☐ Municipal
    - ☐ Industrial
  - ☐ "Converter"
  - ☐ "Protective Filer"
  - ☐ "Non- or Late Filer"
- ☐ Not Specified
- ☐ Other _____

Waste Generated:

- ☒ Onsite
- ☐ Offsite
- ☐ Onsite and Offsite

Waste Deposition Authorized By:

- ☒ Present Owner
- ☐ Former Owner
- ☐ Present & Former Owner
- ☐ Unauthorized
- ☐ Unknown

Waste Accessible to the Public:

- ☒ Yes
- ☐ No

Distance to Nearest Dwelling, School, or Workplace:

0 Feet

6. Waste Characteristics Information

Source Type: (check all that apply)	Source Waste Quantity: (include units)	Tier*:
☒ Landfill	488 acres	A
☐ Surface Impoundment		
☒ Drums	6,000 gallons	W
☐ Tanks and Non-Drum Containers		
☐ Chemical Waste Pile		
☐ Scrap Metal or Junk Pile		
☐ Tailings Pile		
☐ Trash Pile (open dump)		
☐ Land Treatment		
☐ Contaminated Ground Water Plume (unidentified source)		
☐ Contaminated Surface Water/Sediment (unidentified source)		
☒ Contaminated Soil	362,080 ft^3	V
☒ Other ACM	unknown	
☐ No Sources		

* C = Constituent, W = Wastestream, V = Volume, A = Area

General Types of Waste (check all that apply)

- ☒ Metals
- ☒ Organics
- ☒ Inorganics
- ☒ Solvents
- ☒ Paints/Pigments
- ☐ Laboratory/Hospital Waste
- ☐ Radioactive Waste
- ☐ Construction/Demolition Waste
- ☐ Pesticides/Herbicides
- ☒ Acids/Bases
- ☒ Oily Waste
- ☒ Municipal Waste
- ☐ Mining Waste
- ☒ Explosives
- ☐ Other _____

Physical State of Waste as Deposited (check all that apply):

☒ Solid ☒ Sludge ☒ Powder ☒ Liquid ☐ Gas

EPA **Potential Hazardous Waste Site**
Preliminary Assessment Form - Page 3 of 4

CERCLIS Number: CO2210020150

7. Ground Water Pathway

Is Ground Water Used for Drinking Water Within 4 Miles:
☒ Yes
☐ No

Type of Drinking Water Wells Within 4 Miles (check all that apply):
☒ Municipal
☒ Private
☐ None

Is There a Suspected Release to Ground Water:
☒ Yes
☐ No

Have Primary Target Drinking Water Wells Been Identified:
☐ Yes
☒ No

If Yes, Enter Primary Target Population:
_____ People

Depth to Shallowest Aquifer:
5-30 Feet

Karst Terrain/Aquifer Present:
☐ Yes
☒ No

Nearest Designated Wellhead Protection Area:
☐ Underlies Site
☐ >0 - 4 Miles
☒ None Within 4 Miles

List Secondary Target Population Served by Ground Water Withdrawn From:

0 - ¼ Mile	823
> ¼ - ½ Mile	2,794
> ½ - 1 Mile	8,102
> 1 - 2 Miles	20,430
> 2 - 3 Miles	65,687
> 3 - 4 Miles	106,633
Total Within 4 Miles	204,469

8. Surface Water Pathway

Type of Surface Water Draining Site and 15 Miles Downstream (check all that apply):
☒ Stream ☒ River ☒ Pond ☐ Lake
☐ Bay ☐ Ocean ☐ Other _____

Shortest Overland Distance From Any Source to Surface Water:
Ø Feet
Ø Miles

Is There a Suspected Release to Surface Water:
☒ Yes
☐ No

Site is Located in:
☐ Annual - 10 yr Floodplain
☒ > 10 yr - 100 yr Floodplain
☒ > 100 yr - 500 yr Floodplain
☒ > 500 yr Floodplain

Drinking Water Intakes Located Along the Surface Water Migration Path:
☐ Yes
☒ No

Have Primary Target Drinking Water Intakes Been Identified:
☐ Yes
☐ No

If Yes, Enter Population Served by Primary Target Intakes:
_____ People

List All Secondary Target Drinking Water Intakes:

Name	Water Body	Flow (cfs)	Population Served

Total within 15 Miles _____

Fisheries Located Along the Surface Water Migration Path:
☒ Yes
☐ No

Have Primary Target Fisheries Been Identified:
☐ Yes
☒ No

List All Secondary Target Fisheries:

Water Body/Fishery Name	Flow (cfs)
Fountain Creek	11 cfs

CERCLIS Number: CO2210020150

8. Surface Water Pathway (continued)

Wetlands Located Along the Surface Water Migration Path:
☒ Yes
☐ No

Have Primary Target Wetlands Been Identified:
☐ Yes
☒ No

List Secondary Target Wetlands:

Water Body	Flow (cfs)	Frontage Miles
Fountain Creek	11	30

Other Sensitive Environments Located Along the Surface Water Migration Path:
☒ Yes
☐ No

Have Primary Target Sensitive Environments Been Identified:
☐ Yes
☒ No

List Secondary Target Sensitive Environments:

Water Body	Flow (cfs)	Sensitive Environment Type
Fountain Creek	11	30

9. Soil Exposure Pathway

Are People Occupying Residences or Attending School or Daycare on or Within 200 Feet of Areas of Known or Suspected Contamination:
☐ Yes
☒ No

If Yes, Enter Total Resident Population:
_____ People

Number of Workers Onsite:
☐ None
☐ 1 - 100
☐ 101 - 1,000
☒ >1,000

Have Terrestrial Sensitive Environments Been Identified on or Within 200 Feet of Areas of Known or Suspected Contamination:
☒ Yes
☐ No

If Yes, List Each Terrestrial Sensitive Environment:
Habitat for federally listed endangered and sensitive species

10. Air Pathway

Is There a Suspected Release to Air:
☐ Yes
☒ No

Enter Total Population on or Within:

Onsite *	24,844
0 - ¼ Mile	823
> ¼ - ½ Mile	2,794
> ½ - 1 Mile	8,102
> 1 - 2 Miles	20,430
> 2 - 3 Miles	65,687
> 3 - 4 Miles	106,633
Total Within 4 Miles	229,313

* Resident and worker population on Fort Carson proper.

Wetlands Located Within 4 Miles of the Site:
☒ Yes
☐ No

Other Sensitive Environments Located Within 4 Miles of the Site:
☒ Yes
☐ No

List All Sensitive Environments Within ½ Mile of the Site:

Distance	Sensitive Environment Type/Wetlands Area (acres)
Onsite	2
0 - ¼ Mile	6 acres
> ¼ - ½ Mile	20 acres

LATITUDE AND LONGITUDE CALCULATION WORKSHEET #2
LI USING ENGINEER'S SCALE (1/60)

SITE NAME: Ft. Carson CERCLIS #: _____

AKA: _____ SSID: _____

ADDRESS: _____

CITY: _____ STATE: _____ ZIP CODE: _____

SITE REFERENCE POINT: Study Area #1 (Northern)

USGS QUAD MAP NAME: Colorado TOWNSHIP: ___ N/S RANGE: ___ E/W

SCALE: 1:24,000 MAP DATE: _____ SECTION: ___1/4 ___1/4 ___1/4

MAP DATUM: 1927 1983 (CIRCLE ONE) MERIDIAN: _____

COORDINATES FROM LOWER RIGHT (SOUTHEAST) CORNER OF 7.5' MAP (attach photocopy):

LONGITUDE: 104 ° 45 ' 00 " LATITUDE: 38 ° 45 ' 00 "

COORDINATES FROM LOWER RIGHT (SOUTHEAST) CORNER OF 2.5' GRID CELL:

LONGITUDE: 104 ° 47 ' 30 " LATITUDE: 38 ° 45 ' 00 "

CALCULATIONS: LATITUDE (7.5' QUADRANGLE MAP)

A) NUMBER OF RULER GRADUATIONS FROM LATITUDE GRID LINE TO SITE REF POINT: 150

B) MULTIPLY (A) BY 0.3304 TO CONVERT TO SECONDS:

A x 0.3304 = 49.6 "

C) EXPRESS IN MINUTES AND SECONDS (1' = 60"): 0 ' 49 . 6 "

D) ADD TO STARTING LATITUDE: 38 ° 45 ' 0 . 0 " + 0 ' 49 . 6 =

SITE LATITUDE: 38 ° 46 ' 34 . 6 "

CALCULATIONS: LONGITUDE (7.5' QUADRANGLE MAP)

A) NUMBER OF RULER GRADUATIONS FROM RIGHT LONGITUDE LINE TO SITE REF POINT: 45

B) MULTIPLY (A) BY 0.3304 TO CONVERT TO SECONDS:

A x 0.3304 = 14.9 "

C) EXPRESS IN MINUTES AND SECONDS (1' = 60"): 0 ' 14 . 9 "

D) ADD TO STARTING LONGITUDE: 104 ° 47 ' 30 . ___ " + 0 ' 14 . 9 =

SITE LONGITUDE: 104 ° 47 ' 44 . 9 "

INVESTIGATOR: K. Walters DATE: 4/18/94

LATITUDE AND LONGITUDE CALCULATION WORKSHEET #2
LI USING ENGINEER'S SCALE (1/60)

SITE NAME: FT. CARSON CERCLIS #: _____

AKA: _____ SSID: _____

ADDRESS: _____

CITY: _____ STATE: _____ ZIP CODE: _____

SITE REFERENCE POINT: STUDY AREA #2

USGS QUAD MAP NAME: Name removed TOWNSHIP: ___ N/S RANGE: ___ E/W

SCALE: 1:24,000 MAP DATE: _____ SECTION: ___1/4 ___1/4 ___1/4

MAP DATUM: 1927 1983 (CIRCLE ONE) MERIDIAN: _____

COORDINATES FROM LOWER RIGHT (SOUTHEAST) CORNER OF 7.5' MAP (attach photocopy):

LONGITUDE: 104° 45' 00" LATITUDE: 38° 37' 30"

COORDINATES FROM LOWER RIGHT (SOUTHEAST) CORNER OF 2.5' GRID CELL:

LONGITUDE: 104° 45' 00" LATITUDE: 38° 40' 00"

CALCULATIONS: LATITUDE (7.5' QUADRANGLE MAP)

A) NUMBER OF RULER GRADUATIONS FROM LATITUDE GRID LINE TO SITE REF POINT: 85

B) MULTIPLY (A) BY 0.3304 TO CONVERT TO SECONDS:

A x 0.3304 = 28.1"

C) EXPRESS IN MINUTES AND SECONDS (1'= 60"): 0' 28.1"

D) ADD TO STARTING LATITUDE: 38° 40' 00.0" + 0' 28.1" =

SITE LATITUDE: 38° 40' 28.1"

CALCULATIONS: LONGITUDE (7.5' QUADRANGLE MAP)

A) NUMBER OF RULER GRADUATIONS FROM RIGHT LONGITUDE LINE TO SITE REF POINT: 83

B) MULTIPLY (A) BY 0.3304 TO CONVERT TO SECONDS:

A x 0.3304 = 27.4"

C) EXPRESS IN MINUTES AND SECONDS (1'= 60"): 0' 27.4"

D) ADD TO STARTING LONGITUDE: 104° 45' 00.0" + 0' 27.4" =

SITE LONGITUDE: 104° 45' 27.4"

INVESTIGATOR: K. Walters DATE: 4/18/94

LATITUDE AND LONGITUDE CALCULATION WORKSHEET #2
LI USING ENGINEER'S SCALE (1/60)

SITE NAME: FT. CARSON CERCLIS #: _____

AKA: _____ SSID: _____

ADDRESS: _____

CITY: _____ STATE: _____ ZIP CODE: _____

SITE REFERENCE POINT: STUDY AREA #3

USGS QUAD MAP NAME: Name Removed TOWNSHIP: ___ N/S RANGE: ___ E/W

SCALE: 1:24,000 MAP DATE: _____ SECTION: ___1/4 ___1/4 ___1/4

MAP DATUM: 1927 1983 (CIRCLE ONE) MERIDIAN: _____

COORDINATES FROM LOWER RIGHT (SOUTHEAST) CORNER OF 7.5' MAP (attach photocopy):

LONGITUDE: 104 ° 47 ' 30 " LATITUDE: 38 ° 30 ' 00 "

COORDINATES FROM LOWER RIGHT (SOUTHEAST) CORNER OF 2.5' GRID CELL:

LONGITUDE: 104 ° 50 ' 00 " LATITUDE: 38 ° 35 ' 00 "

CALCULATIONS: LATITUDE (7.5' QUADRANGLE MAP)

A) NUMBER OF RULER GRADUATIONS FROM LATITUDE GRID LINE TO SITE REF POINT: 171

B) MULTIPLY (A) BY 0.3304 TO CONVERT TO SECONDS:

A x 0.3304 = 56.5 "

C) EXPRESS IN MINUTES AND SECONDS (1' = 60"): 0 ' 56.5 "

D) ADD TO STARTING LATITUDE: 38 ° 35 ' 00.0 " + 0 ' 56.5 " =

SITE LATITUDE: 38 ° 35 ' 56.5 "

CALCULATIONS: LONGITUDE (7.5' QUADRANGLE MAP)

A) NUMBER OF RULER GRADUATIONS FROM RIGHT LONGITUDE LINE TO SITE REF POINT: 365

B) MULTIPLY (A) BY 0.3304 TO CONVERT TO SECONDS:

A x 0.3304 = 120.6 "

C) EXPRESS IN MINUTES AND SECONDS (1' = 60"): 2 ' 00.6 "

D) ADD TO STARTING LONGITUDE: 104 ° 50 ' 00.0 " + 2 ' 00.6 " =

SITE LONGITUDE: 104 ° 52 ' 0.6 "

INVESTIGATOR: K. Walters DATE: 4/18/94

eliminate

LATITUDE AND LONGITUDE CALCULATION WORKSHEET #2
LI USING ENGINEER'S SCALE (1/60)

SITE NAME: FT CARSON CERCLIS #: _____

AKA: _____ SSID: _____

ADDRESS: _____

CITY: _____ STATE: _____ ZIP CODE: _____

SITE REFERENCE POINT: STUDY AREA #4

USGS QUAD MAP NAME: Name Removed TOWNSHIP: ___ N/S RANGE: ___ E/W

SCALE: 1:24,000 MAP DATE: _____ SECTION: ___1/4 ___1/4 ___1/4

MAP DATUM: 1927 1983 (CIRCLE ONE) MERIDIAN: _____

COORDINATES FROM LOWER RIGHT (SOUTHEAST) CORNER OF 7.5' MAP (attach photocopy):

LONGITUDE: 104 ° 37 ' 30 " LATITUDE: 38 ° 30 ' 00 "

COORDINATES FROM LOWER RIGHT (SOUTHEAST) CORNER OF 2.5' GRID CELL:

LONGITUDE: 104 ° 42 ' 30 " LATITUDE: 38 ° 30 ' 00 "

CALCULATIONS: LATITUDE (7.5' QUADRANGLE MAP)

A) NUMBER OF RULER GRADUATIONS FROM LATITUDE GRID LINE TO SITE REF POINT: 405

B) MULTIPLY (A) BY 0.3304 TO CONVERT TO SECONDS:

A x 0.3304 = 133.8 "

C) EXPRESS IN MINUTES AND SECONDS (1'= 60"): 2 ' 13.8 "

D) ADD TO STARTING LATITUDE: 38 ° 30 ' 00.0 " + 2 ' 13.8 " =

SITE LATITUDE: 38 ° 32 ' 13.8 "

CALCULATIONS: LONGITUDE (7.5' QUADRANGLE MAP)

A) NUMBER OF RULER GRADUATIONS FROM RIGHT LONGITUDE LINE TO SITE REF POINT: 210

B) MULTIPLY (A) BY 0.3304 TO CONVERT TO SECONDS:

A x 0.3304 = 69.4 "

C) EXPRESS IN MINUTES AND SECONDS (1'= 60"): 1 ' 9.4 "

D) ADD TO STARTING LONGITUDE: 104 ° 42 ' 30.0 " + 1 ' 9.4 " =

SITE LONGITUDE: 104 ° 43 ' 39.4 "

INVESTIGATOR: K. Walters DATE: 4/18/94

eliminate

LATITUDE AND LONGITUDE CALCULATION WORKSHEET #2
LI USING ENGINEER'S SCALE (1/60)

SITE NAME: FT. Carson CERCLIS #: _____

AKA: _____ SSID: _____

ADDRESS: _____

CITY: _____ STATE: _____ ZIP CODE: _____

SITE REFERENCE POINT: STUDY AREA #5

USGS QUAD MAP NAME: Name Removed TOWNSHIP: ___ N/S RANGE: ___ E/W

SCALE: 1:24,000 MAP DATE: _____ SECTION: ___1/4 ___1/4 ___1/4

MAP DATUM: 1927 1983 (CIRCLE ONE) MERIDIAN: _____

COORDINATES FROM LOWER RIGHT (SOUTHEAST) CORNER OF 7.5' MAP (attach photocopy):

LONGITUDE: 104° 45' 00" LATITUDE: 38° 22' 30"

COORDINATES FROM LOWER RIGHT (SOUTHEAST) CORNER OF 2.5' GRID CELL:

LONGITUDE: 104° 50' 00" LATITUDE: 38° 25' 00"

CALCULATIONS: LATITUDE (7.5' QUADRANGLE MAP)

A) NUMBER OF RULER GRADUATIONS FROM LATITUDE GRID LINE TO SITE REF POINT: 304

B) MULTIPLY (A) BY 0.3304 TO CONVERT TO SECONDS:

A x 0.3304 = 100.4"

C) EXPRESS IN MINUTES AND SECONDS (1'= 60"): 1' 40.4"

D) ADD TO STARTING LATITUDE: 38° 25' 00.0" + 1' 40.4" =

SITE LATITUDE: 38° 26' 40.4"

CALCULATIONS: LONGITUDE (7.5' QUADRANGLE MAP)

A) NUMBER OF RULER GRADUATIONS FROM RIGHT LONGITUDE LINE TO SITE REF POINT: 296

B) MULTIPLY (A) BY 0.3304 TO CONVERT TO SECONDS:

A x 0.3304 = 97.8"

C) EXPRESS IN MINUTES AND SECONDS (1'= 60"): 1' 37.8"

D) ADD TO STARTING LONGITUDE: 104° 50' 00.0" + 1' 37.8" =

SITE LONGITUDE: 104° 51' 37.8"

INVESTIGATOR: K. Wallers DATE: 4/18/94

APPENDIX B

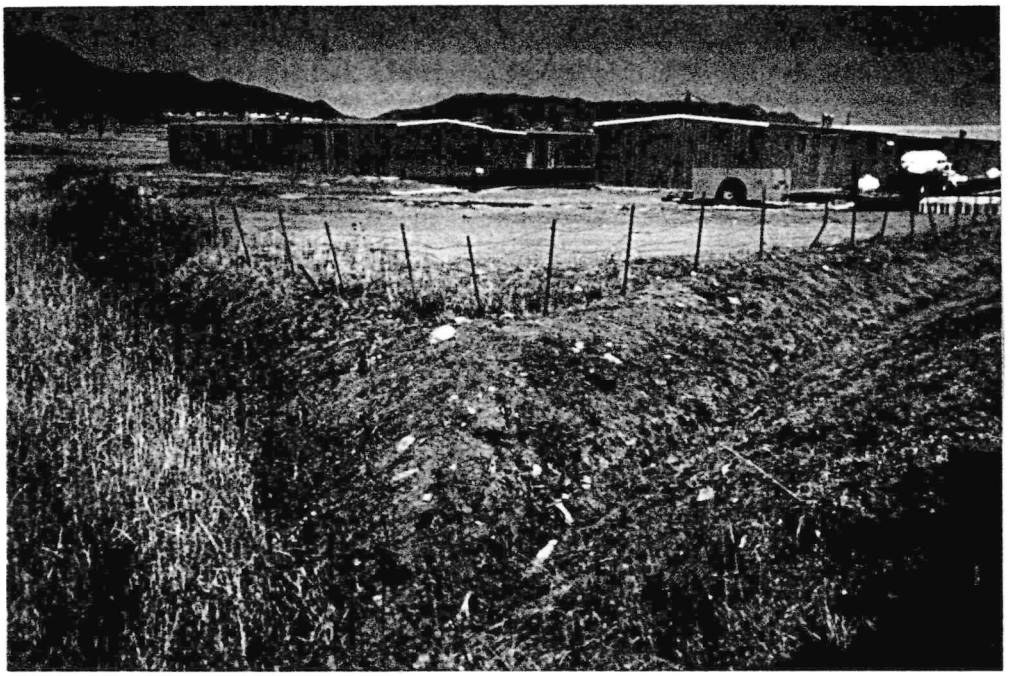
PHOTOGRAPHIC LOG FROM SITE VISIT
22-29 MARCH 1994

Photograph No. 1, Source No. 1, Landfill No. 1, looking southeast.

Photograph No. 2, Source No. 2, Landfill No. 2, looking east.

Photograph No. 3, Source No. 2, Landfill No. 2, looking west.

Photograph No. 4, Source No. 3, Landfill No. 3



Photograph No. 5, Source No. 4, Landfill No. 4, looking northwest, showing buildings on top of former landfill.

Photograph No. 6, Source No.5, Landfill No. 5, looking northwest.

Photograph No. 7, Source No. 6, Landfill No. 6.

Photograph No. 8, Source No. 8, Landfill No. 8.

Photograph No. 9, Source No. 9, Landfill No. 9, overview.

Photograph No. 10, Source No. 9, Landfill No. 9, close up at buried shell casing.

Photograph No. 11, Source No. 10, Landfill No. 10.

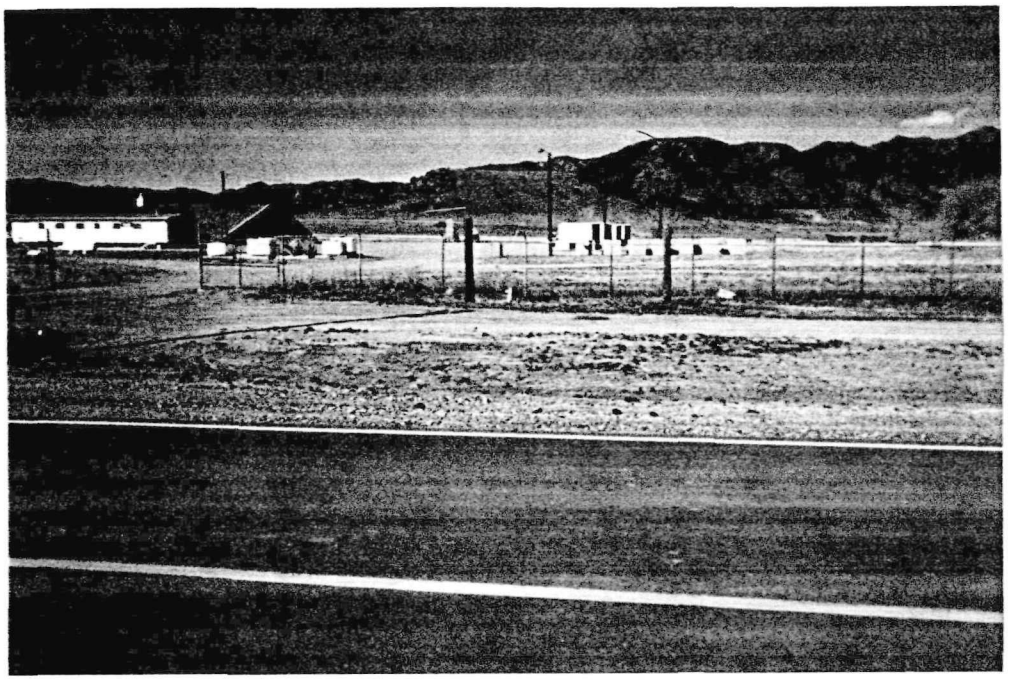
Photograph No. 12, Source No. 11, Landfill No. 11.

Photograph No. 13, Source No. 12, Landfill No.12, looking north.

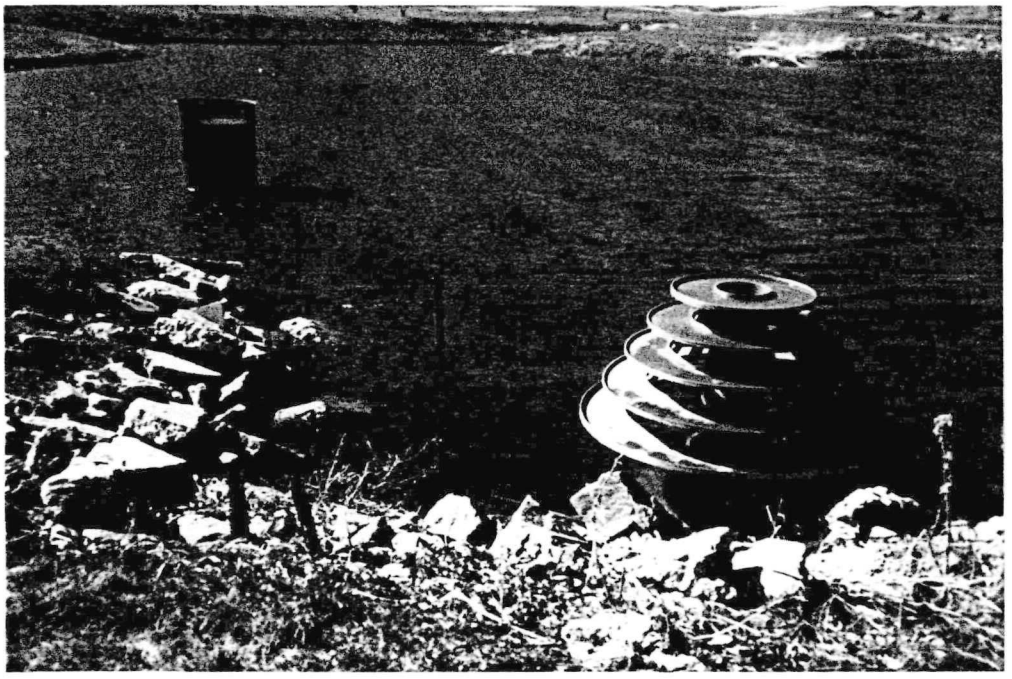
Photograph No. 14, Source No. 13, Pete's Hill Dump, looking west up canyon toward active face of landfill.

Photograph No. 15, Source No. 14, Range 121 open dumping area.

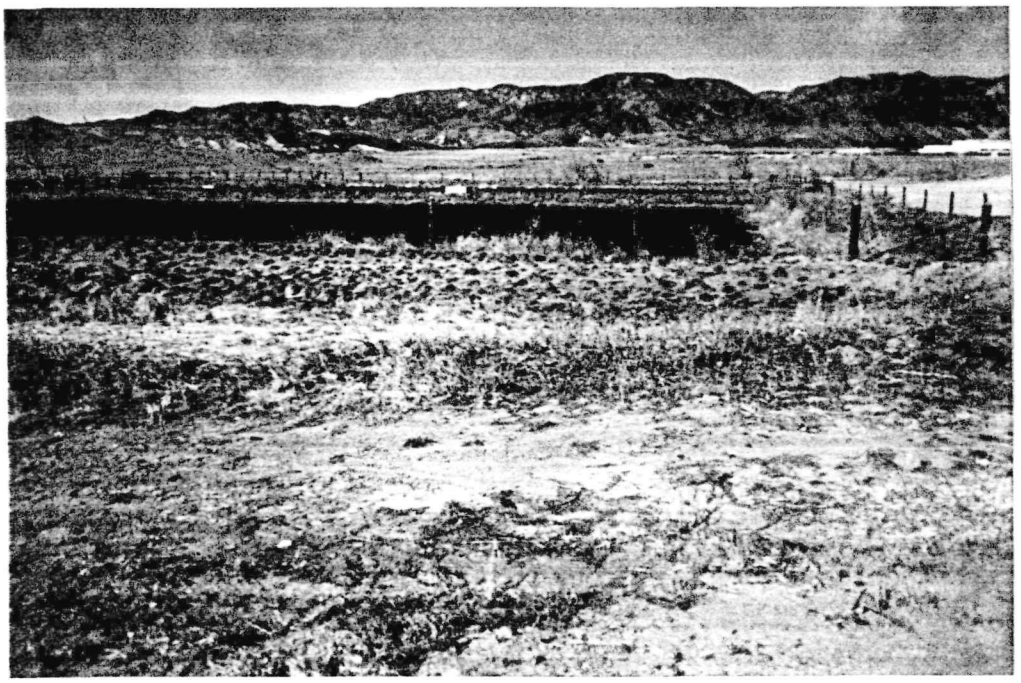
Photograph No. 16, Source No. 16, DRMO hazardous waste storage area.



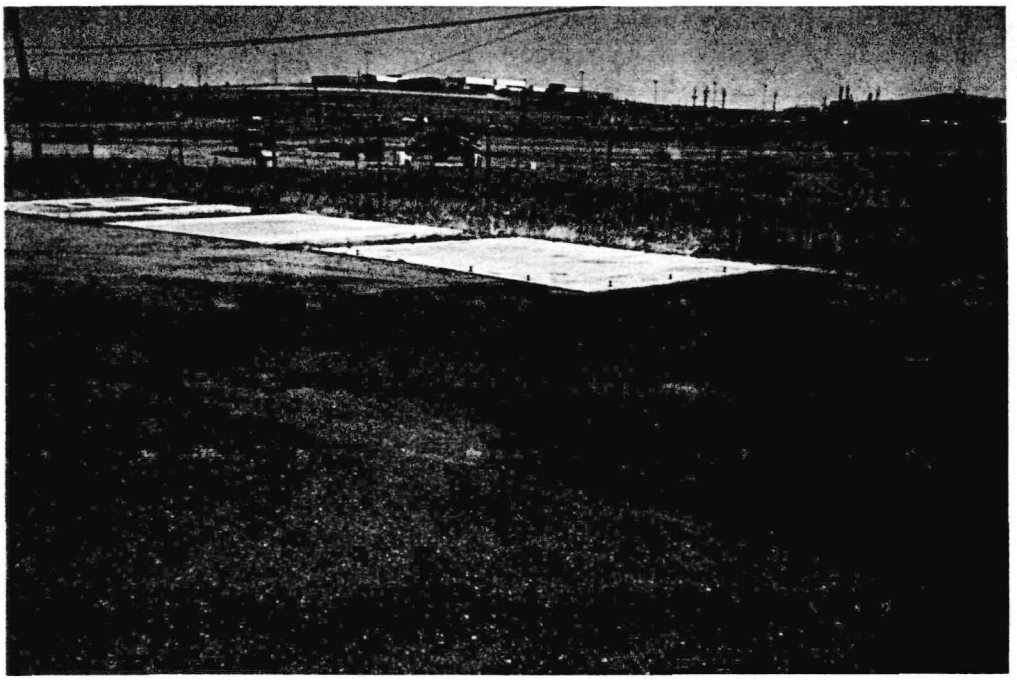
Photograph No. 17, Source No. 17, Hazardous waste and PCB storage facility, and 90-day TSDFs.



Photograph No. 18, Source No. 18, Golf course holding pond.



Photograph No. 19, Source No. 19, Sewage treatment ponds, Butts Army Airfield.



Photograph No. 20, Source No. 20, DIO former hazardous waste storage area.

Photograph No. 21, Source No. 21, Drainage ditch adjacent to Building 301.

Photograph No. 22, Source No. 22, STP sludge spreading area.

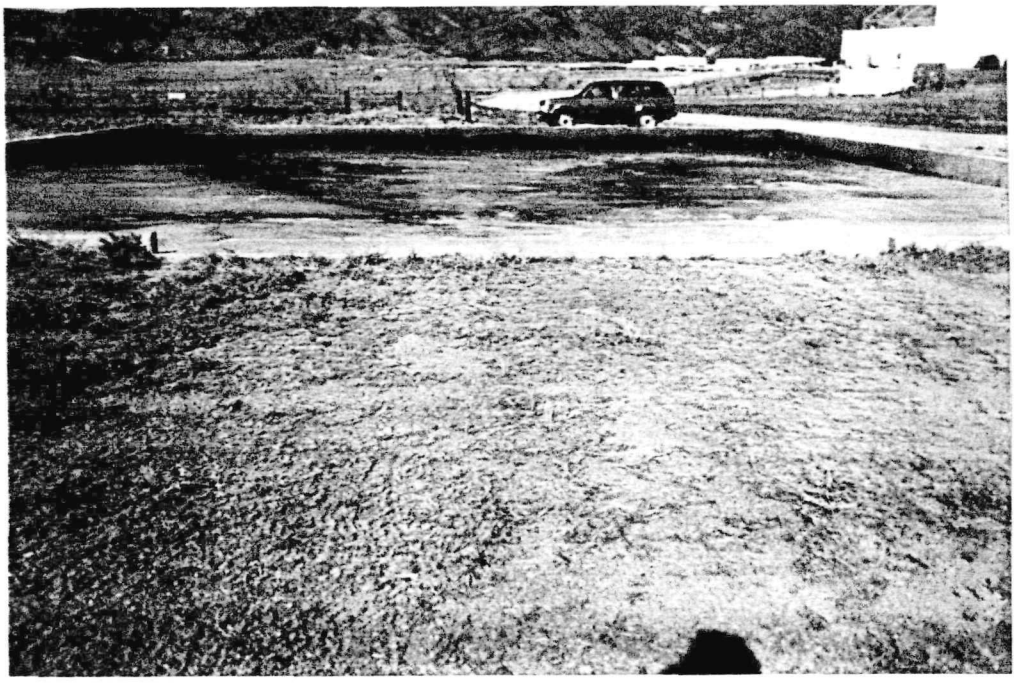
Photograph No. 23, Source No. 23, Former demolition/EOD area.

Photograph No. 24, Source No. 24, Range 1 open burning grounds.

Photograph No. 25, Source No. 25, Range 1A open burning grounds.

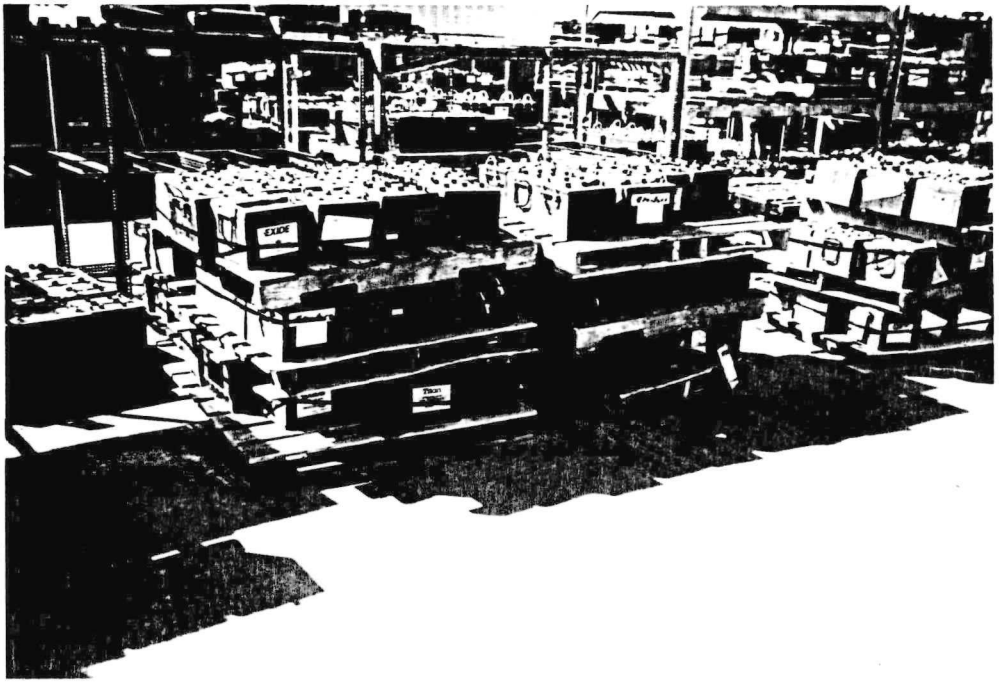
Photograph No. 26, Source No. 26, Range 121 EOD area.

Photograph No. 27, Source No. 27, Grit/oil pit.

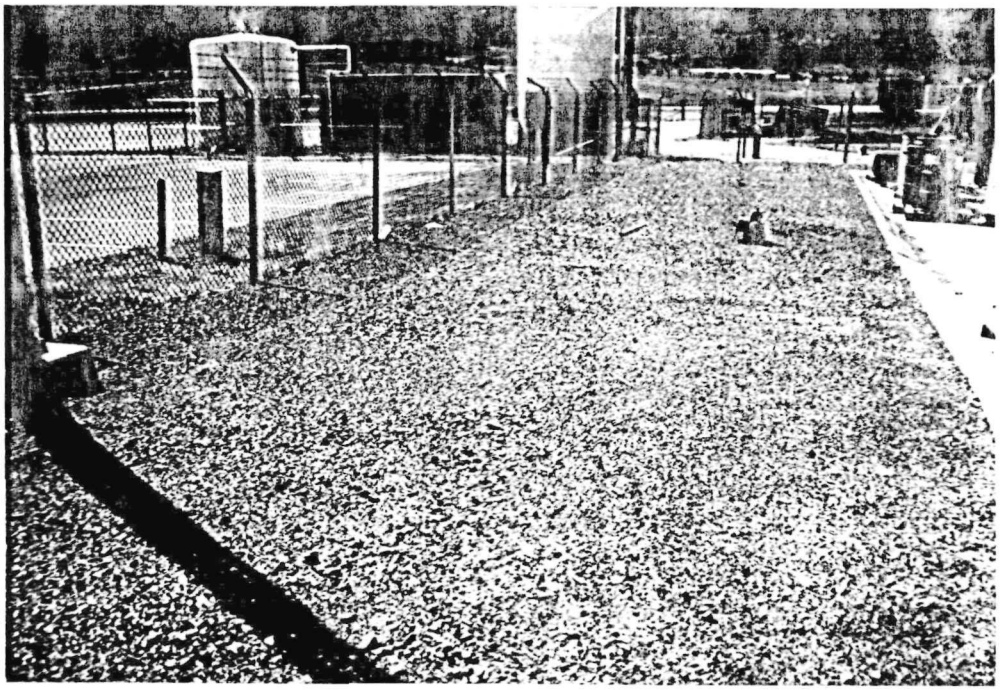


Photograph No. 28, Source No. 28, Fire training area, Butts Army Airfield

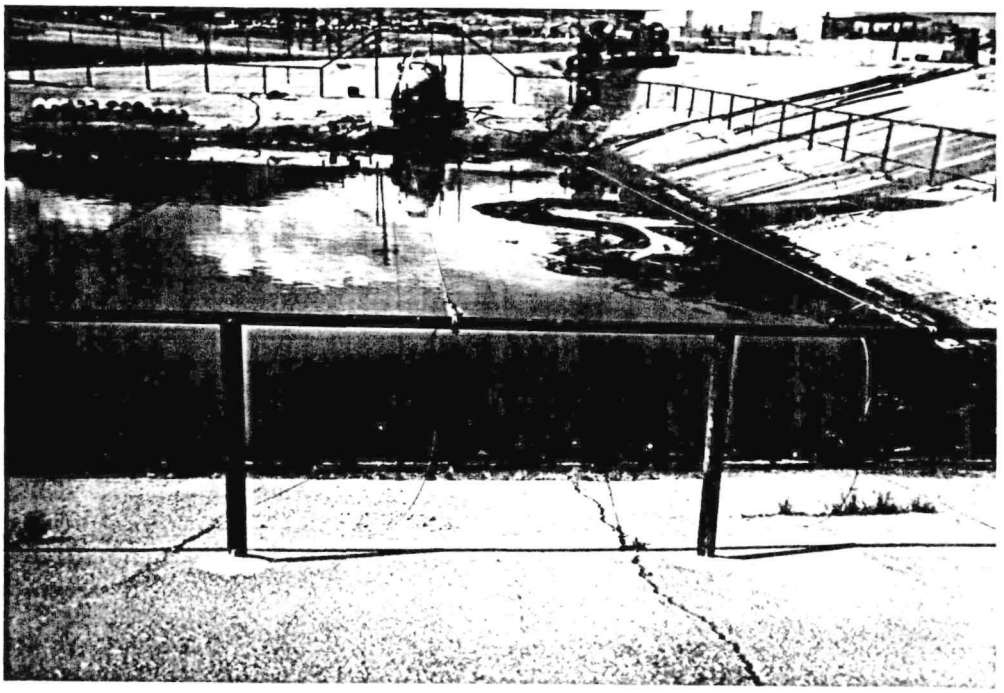
Photograph No. 29, Source No. 29, Range 123 EOD area.



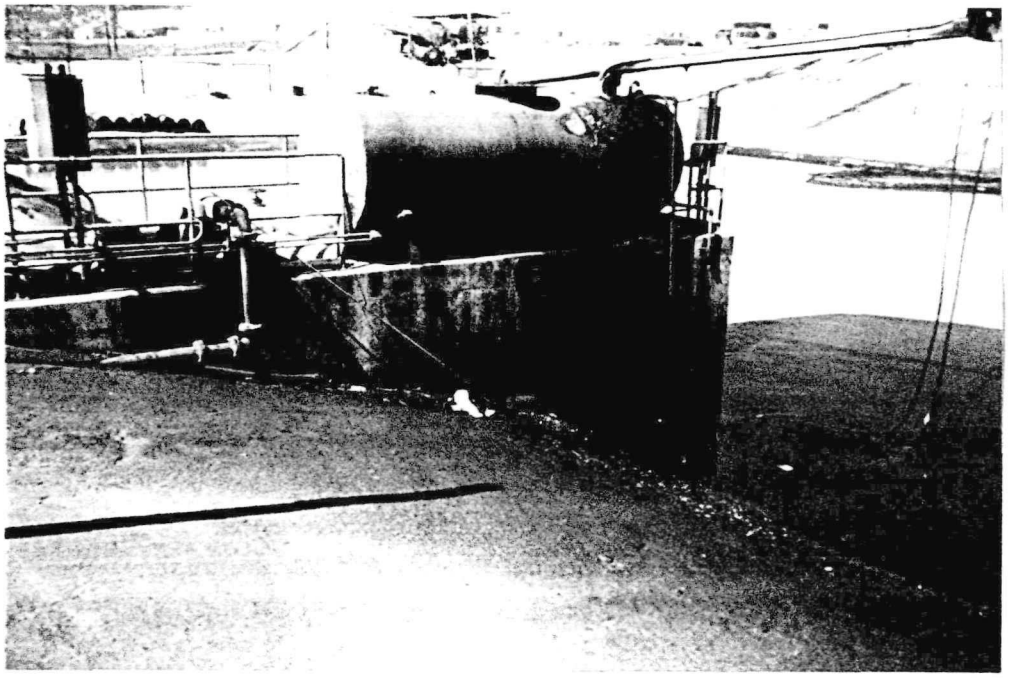
Photograph No. 30, Source No. 32, Battery storage area, Building 8000.



Photograph No. 31, Source No. 34, Former UST area outside Building 8000.



Photograph No. 32, Source No. 35, Equalization basin, Building 1399.



Photograph No. 33, Source No. 35, Equalization basin, Building 1399.

Photograph No. 34, Source No. 36, EOD area, Range 123.

APPENDIX C

SOURCE LOCATION SKETCHES AND OTHER INFORMATION

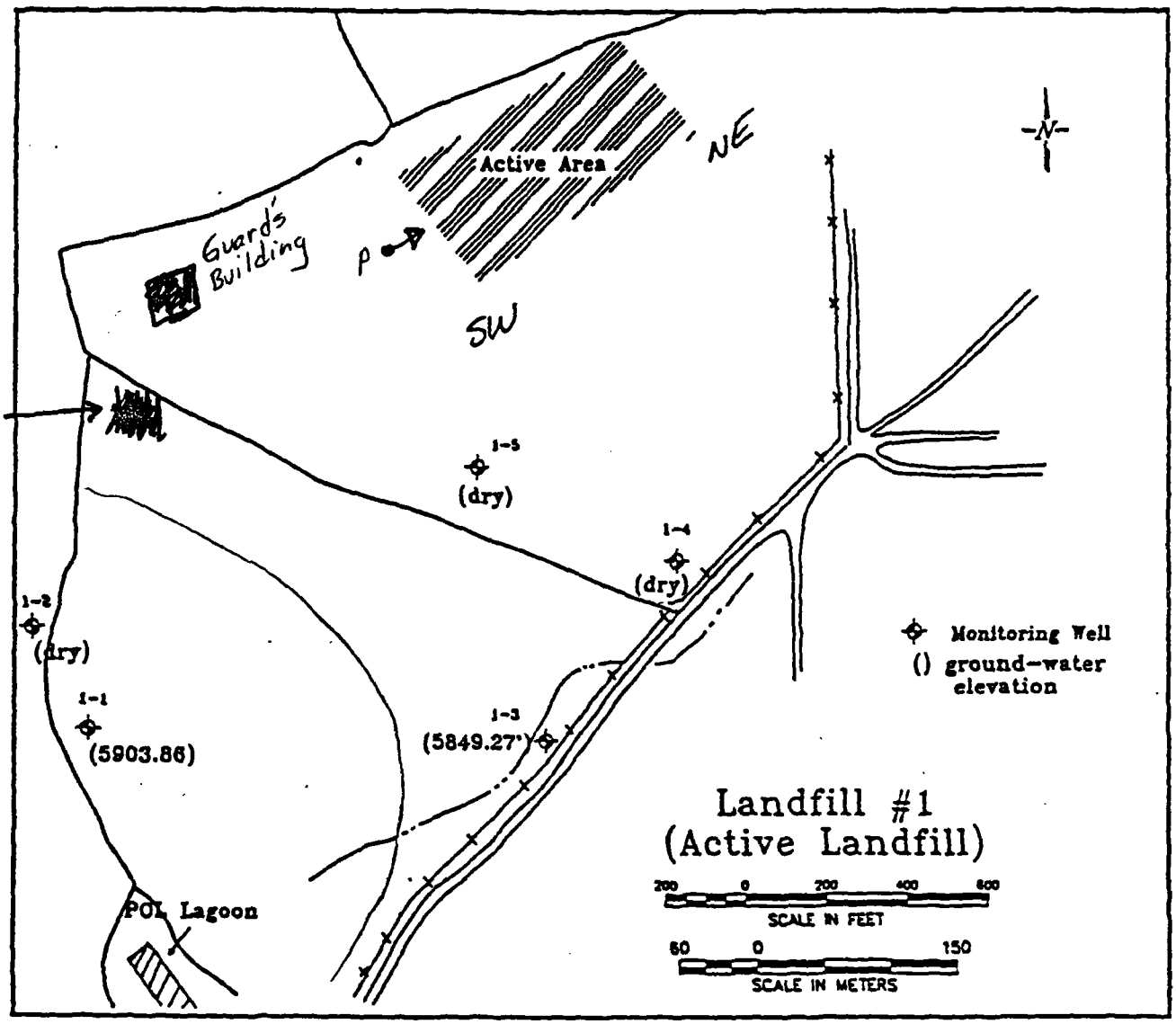
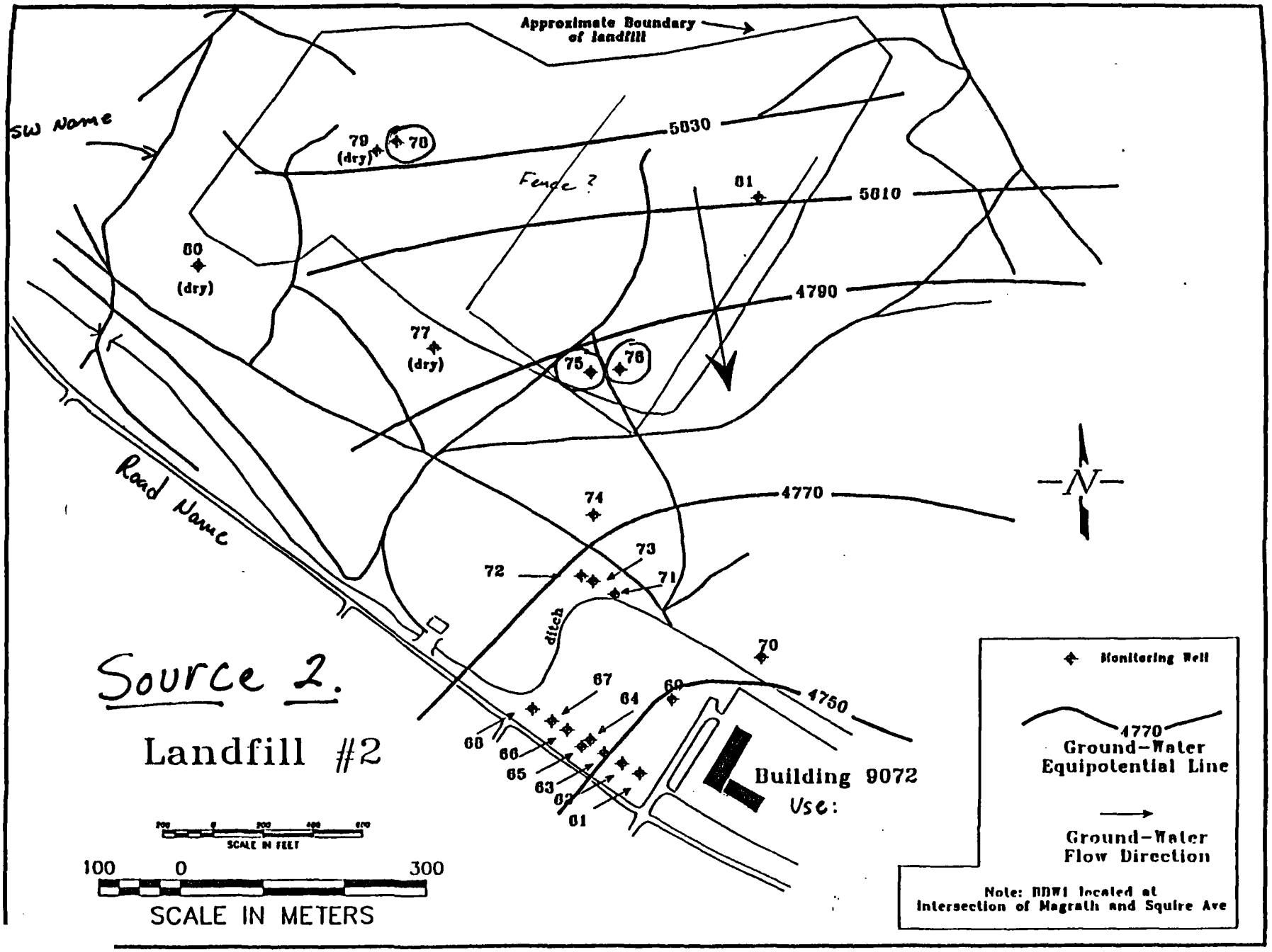


FIGURE 2. LANDFILL #1 MONITORING WELL LOCATIONS

Source 1.

1. establish orientation of trenches
2. Is active area still active? yes
3. Does fence surround LF? yes, LF attendant
4. Need Road names (none)



Source 2.

Landfill #2

Fence?

9

FIGURE 3. LANDFILL #2 MONITORING WELL LOCATIONS AND GROUND-WATER POTENTIOMETRIC SURFACE

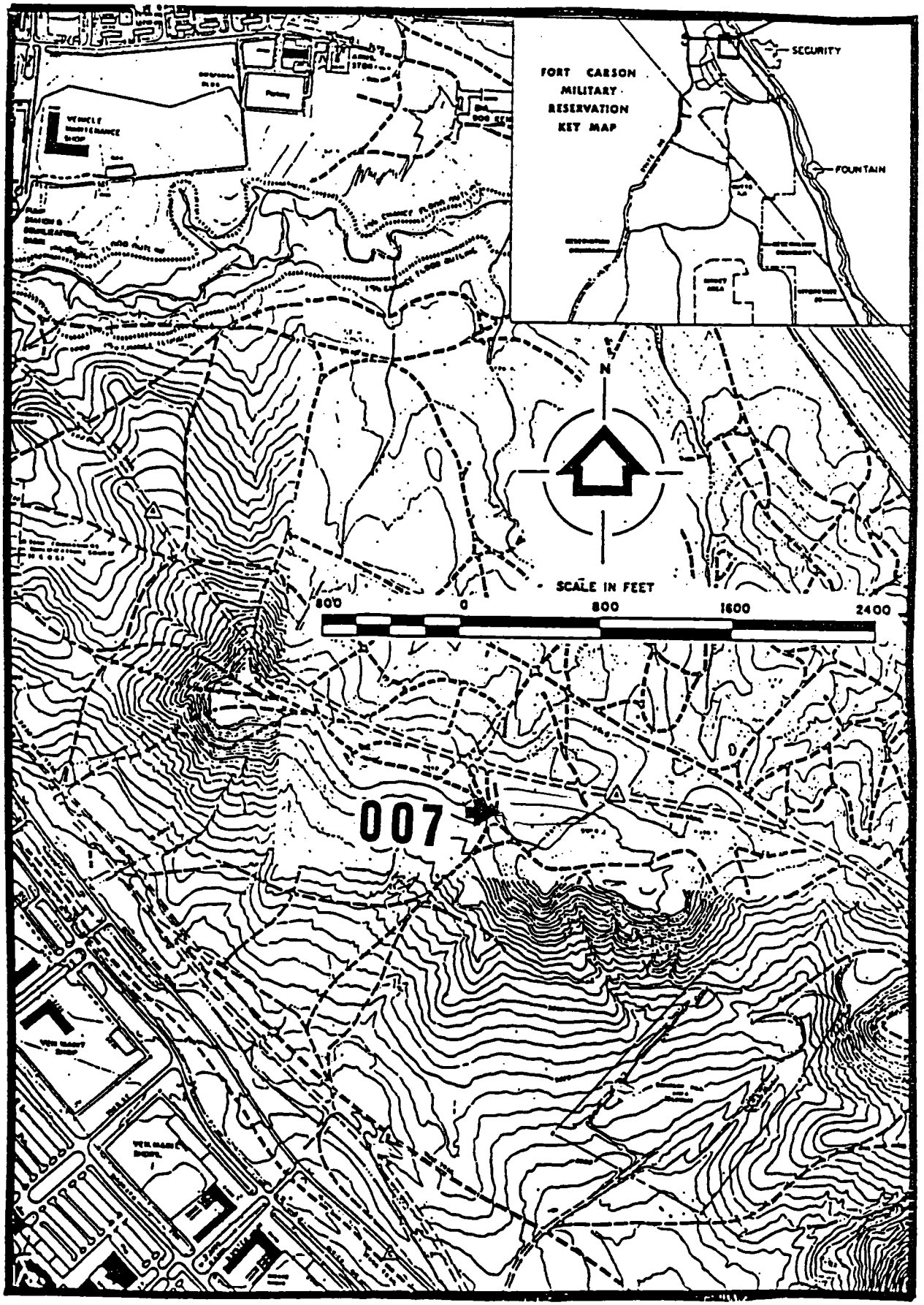


FIGURE B-4. Landfill #3, Source 3.

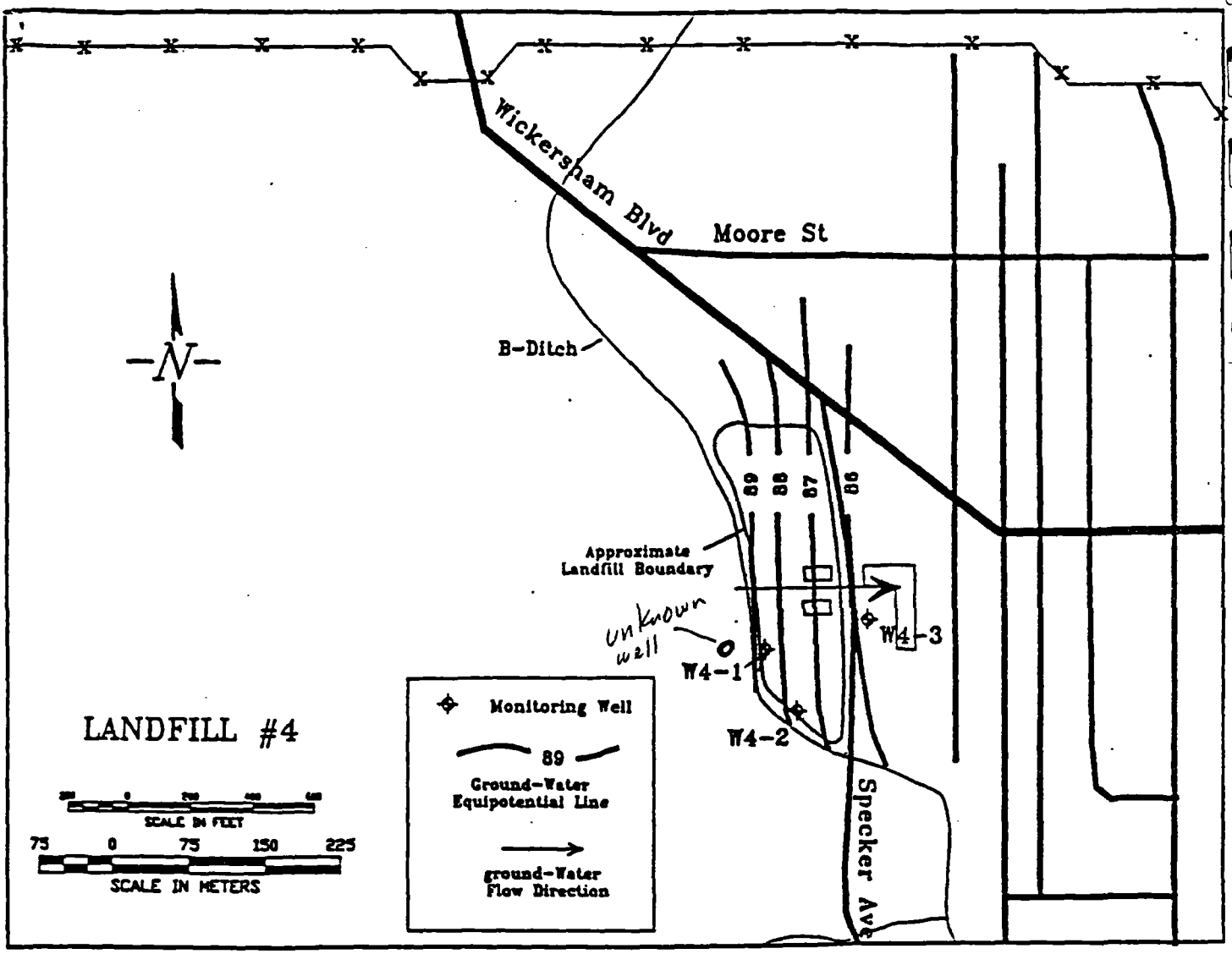


FIGURE 4. LANDFILL #4 MONITORING WELL LOCATIONS AND GROUND-WATER POTENTIOMETRIC SURFACE.

Source 4.

Coordinate Fig. B-4 + Fig. 4 MW

Update map

no lock on 2 inch

Security?

What is this?

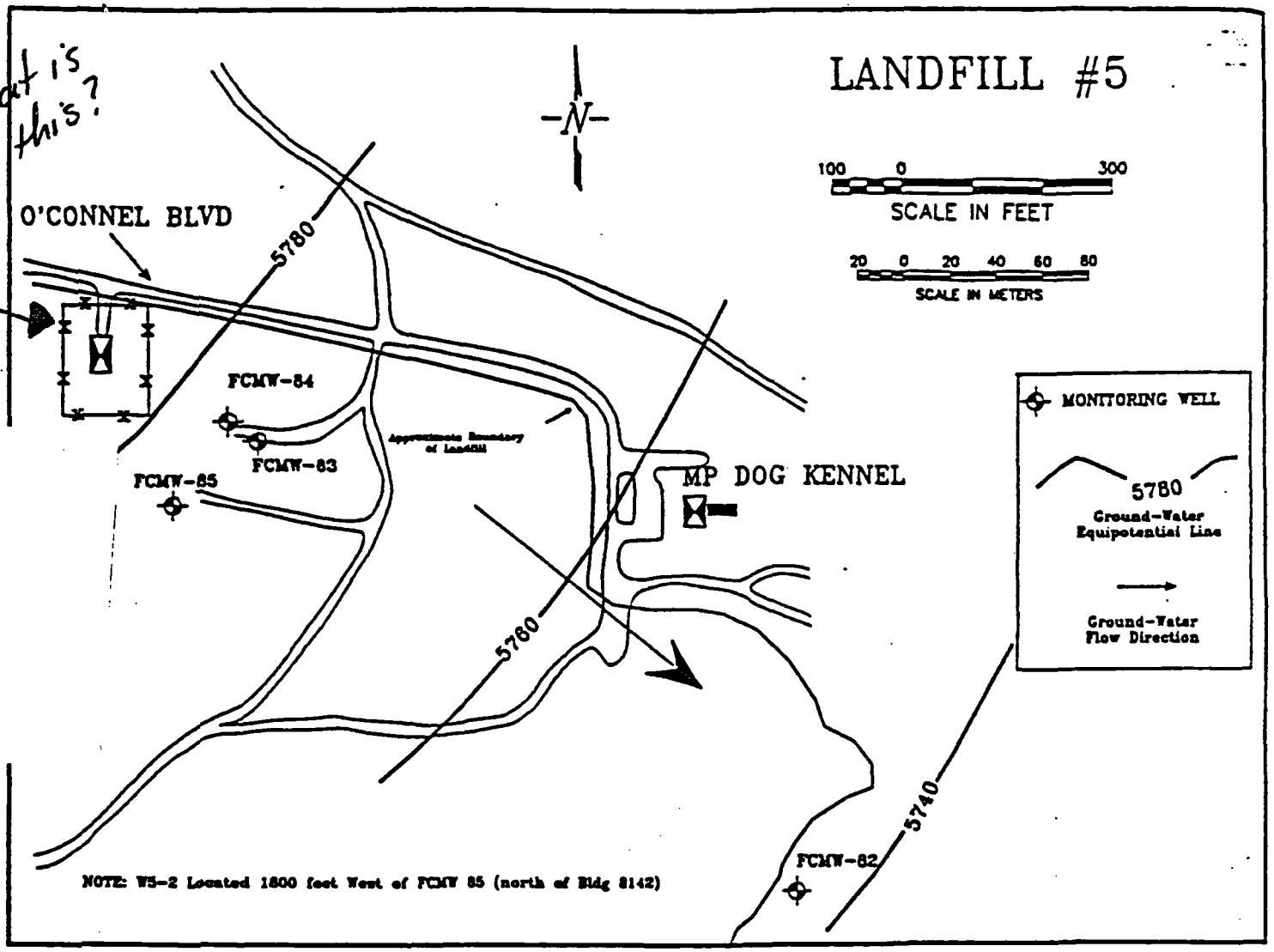


FIGURE 5. LANDFILL #5 MONITORING WELL LOCATIONS AND GROUND-WATER POTENTIOMETRIC SURFACE Source 5.

Coordinate this with Fig. B-4 (they don't show same location)

Establish LF boundary.

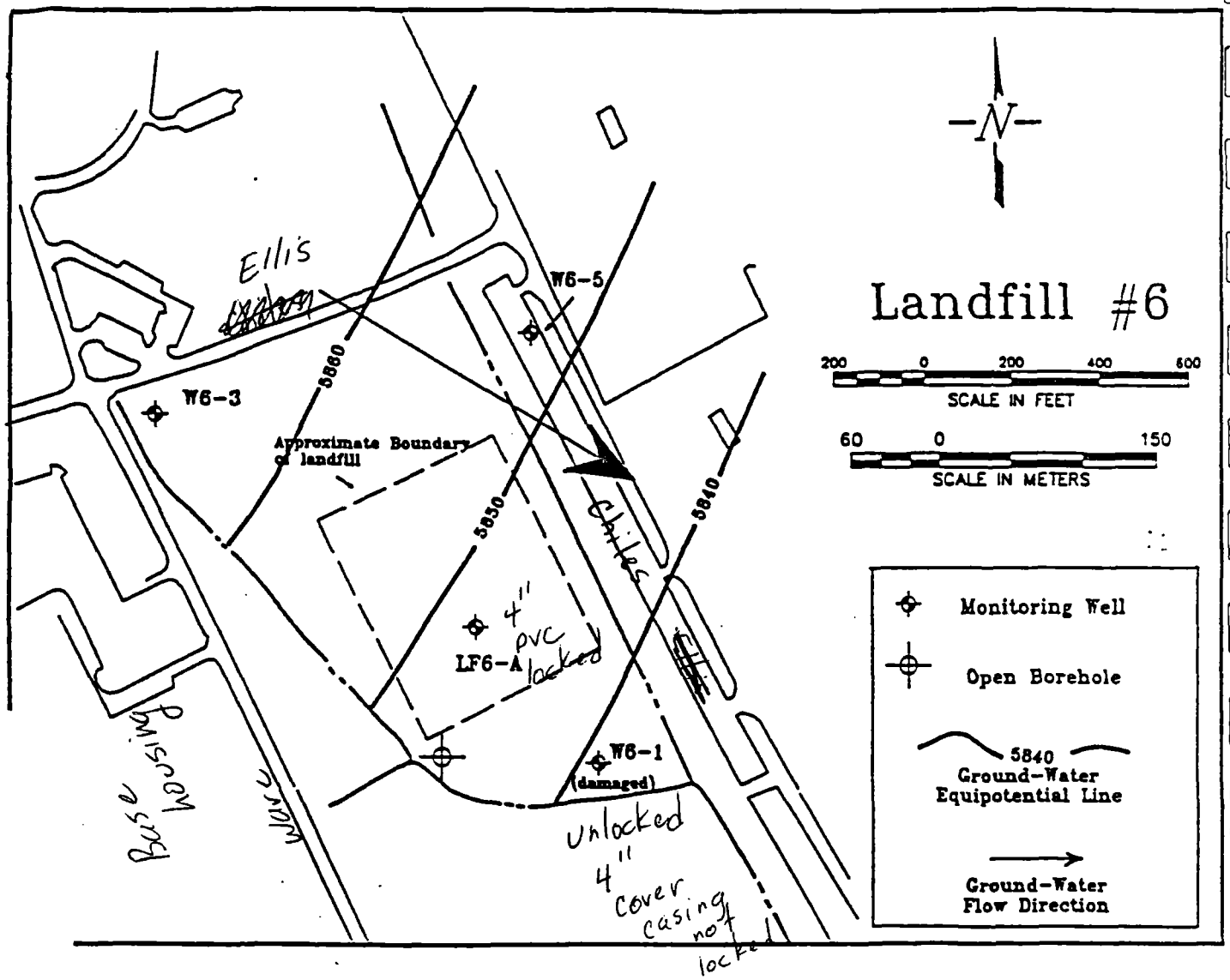


FIGURE 6. LANDFILL #6 MONITORING WELL LOCATIONS AND GROUND-WATER POTENTIOMETRIC SURFACE

Source 6?
= W6-1?

Has sheared off borehole (LF6C) been sealed?

~~What SW is near LF?~~

~~Road names.~~

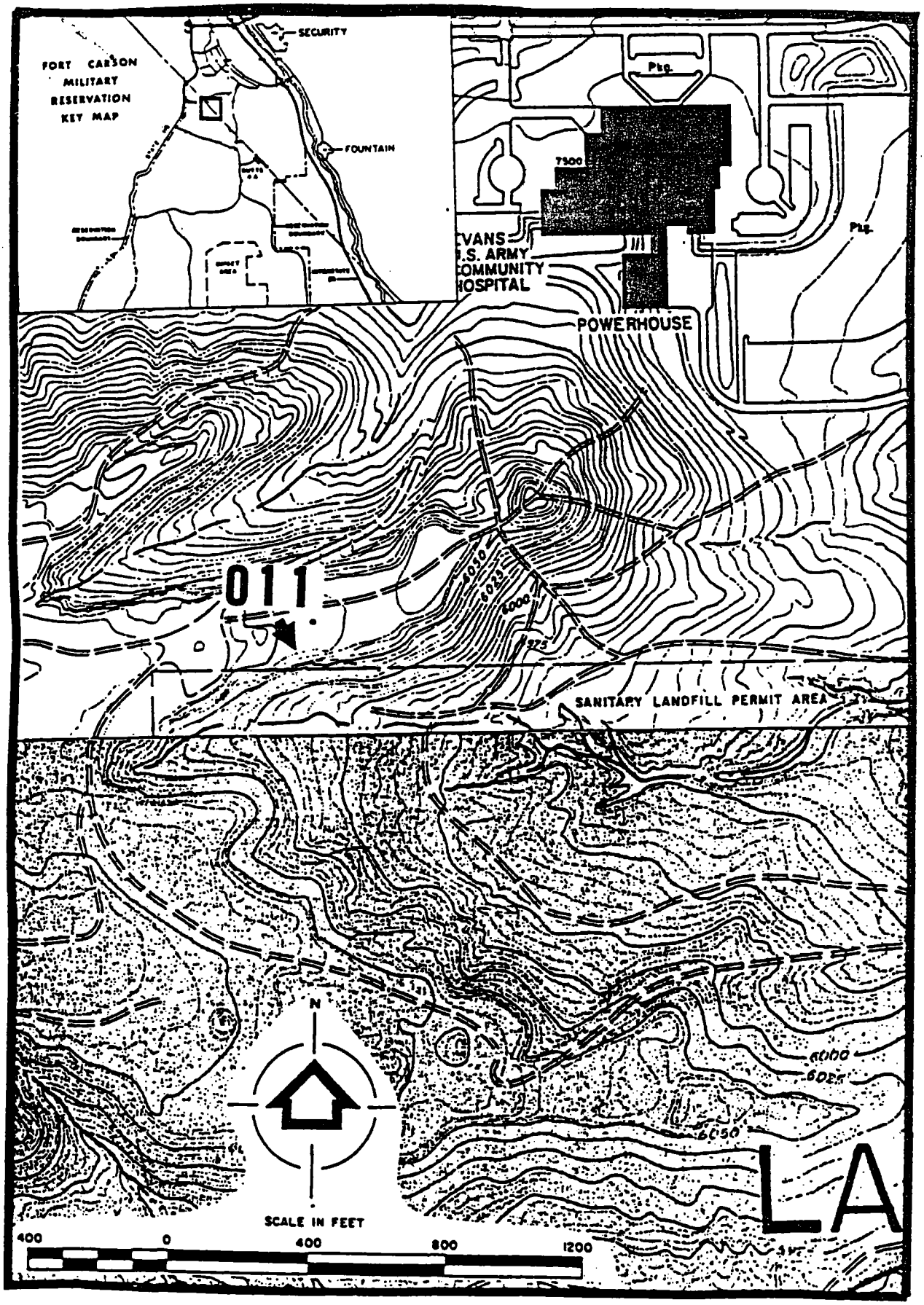


FIGURE B-9. Landfill #7, Source 7.

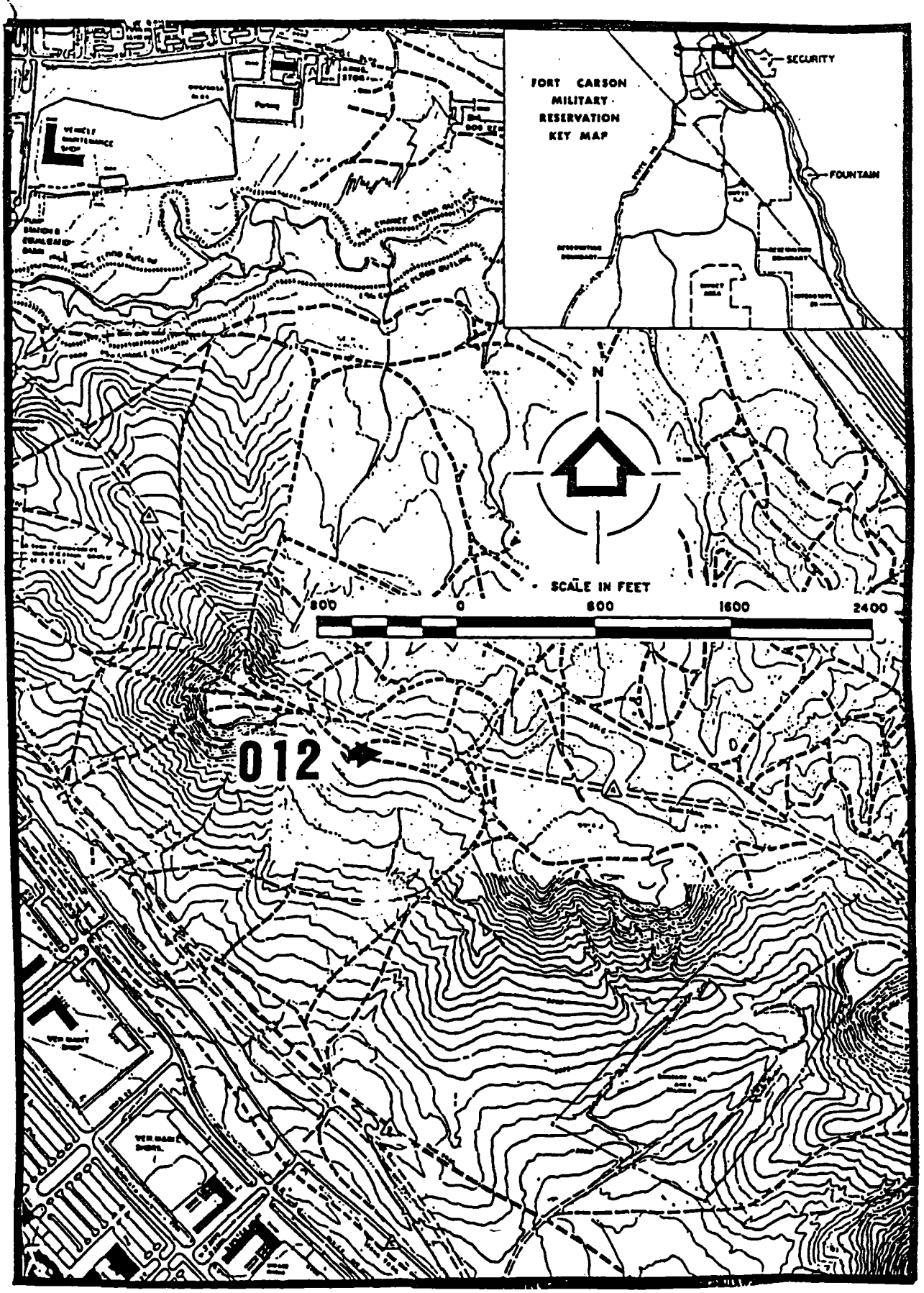


FIGURE B-10. Landfill #8, Source 8.

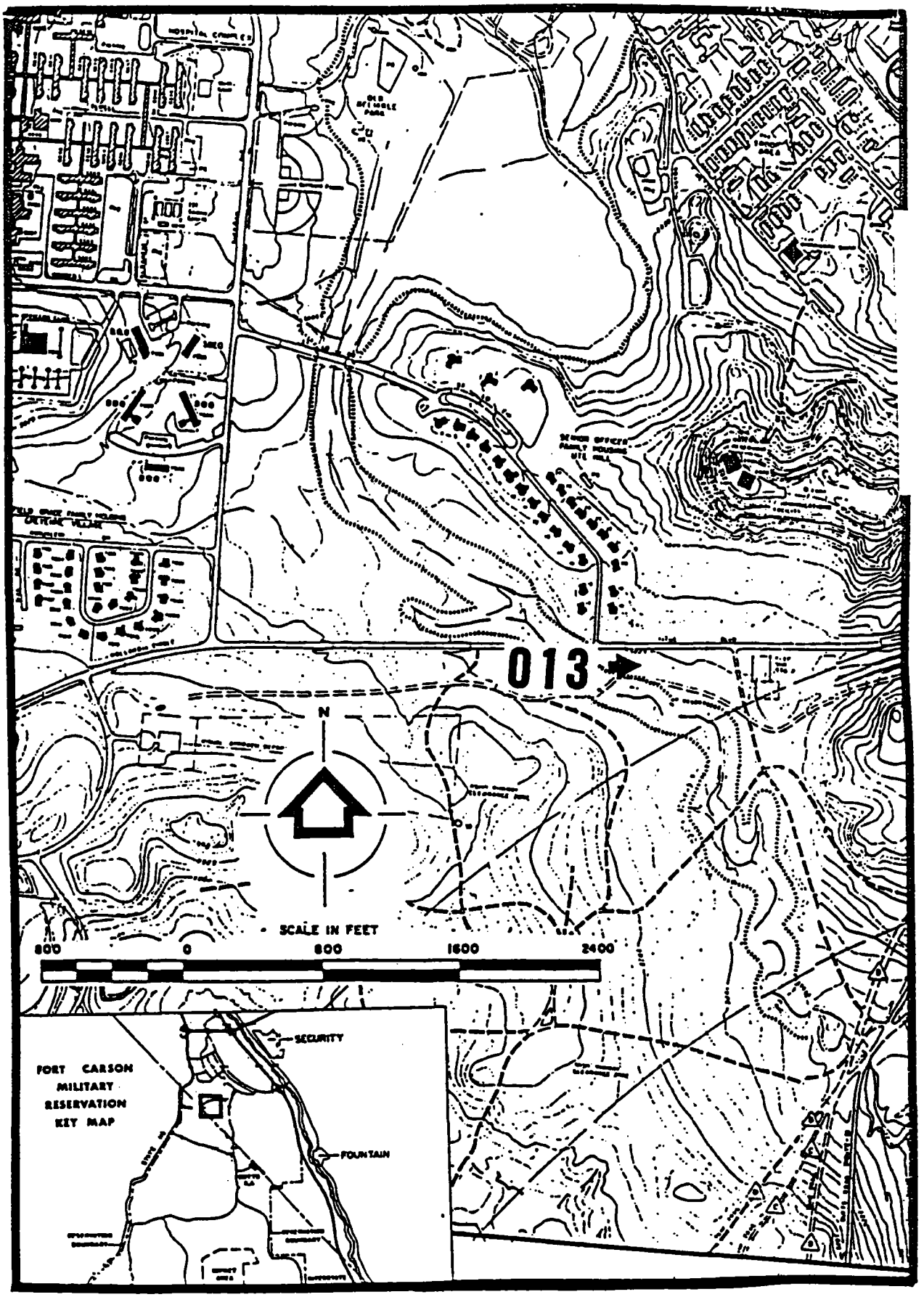


FIGURE B-11. Landfill #9, Source 9.

Copy

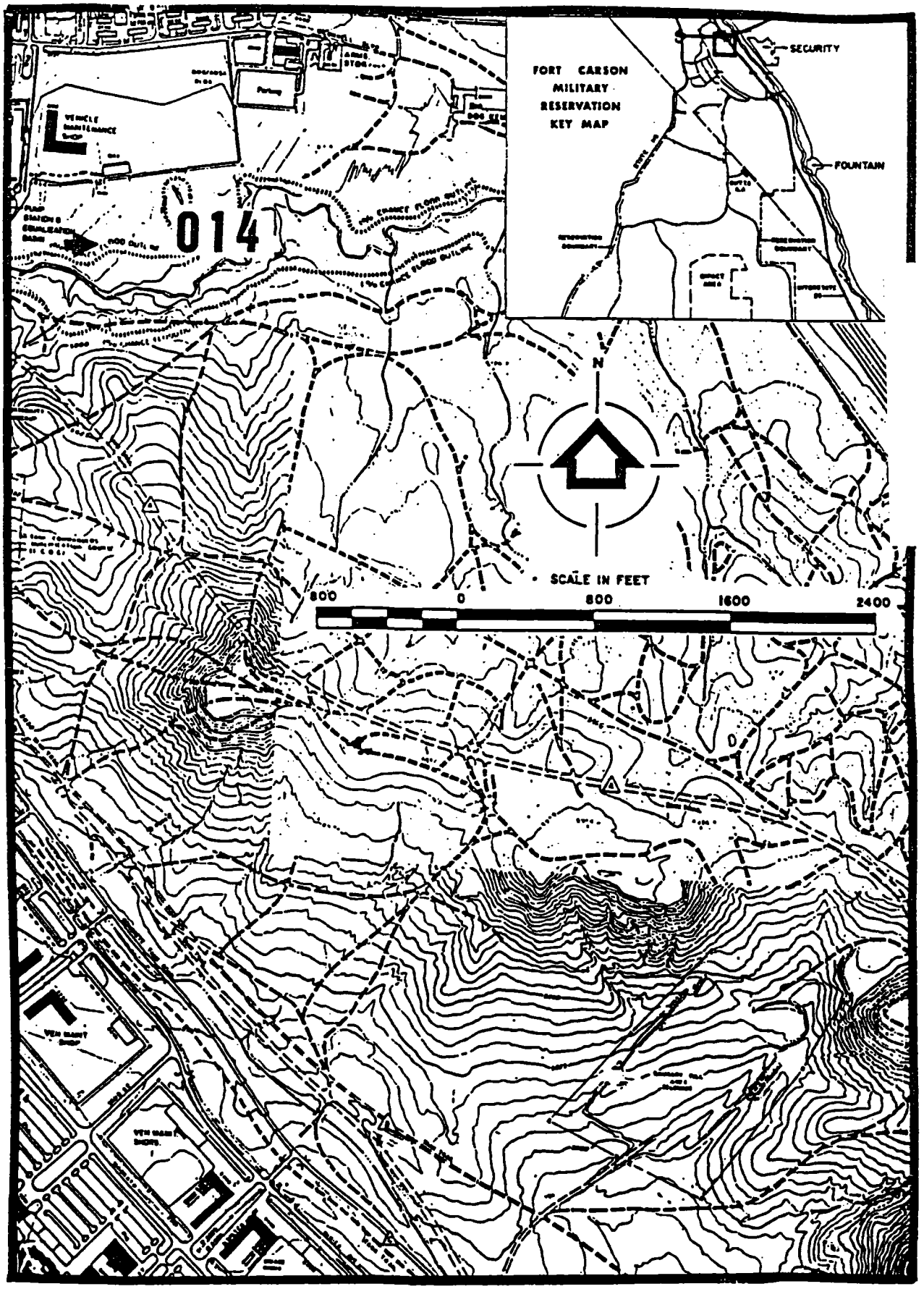


FIGURE B-12. Landfill #10, Source 10.

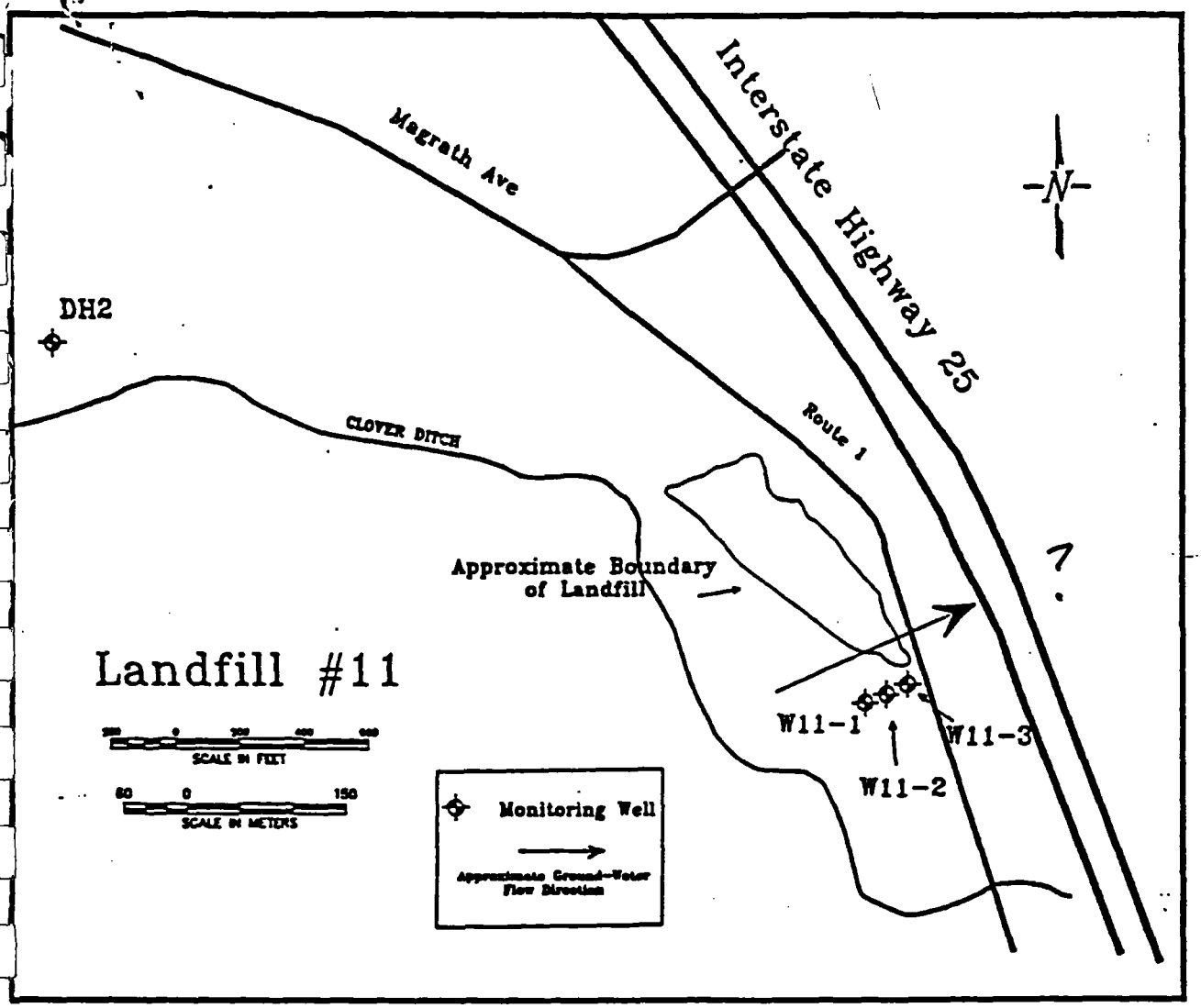


FIGURE 7. LANDFILL #11 MONITORING WELL LOCATIONS AND APPROXIMATE GROUND-WATER FLOW DIRECTION (Source 11.)

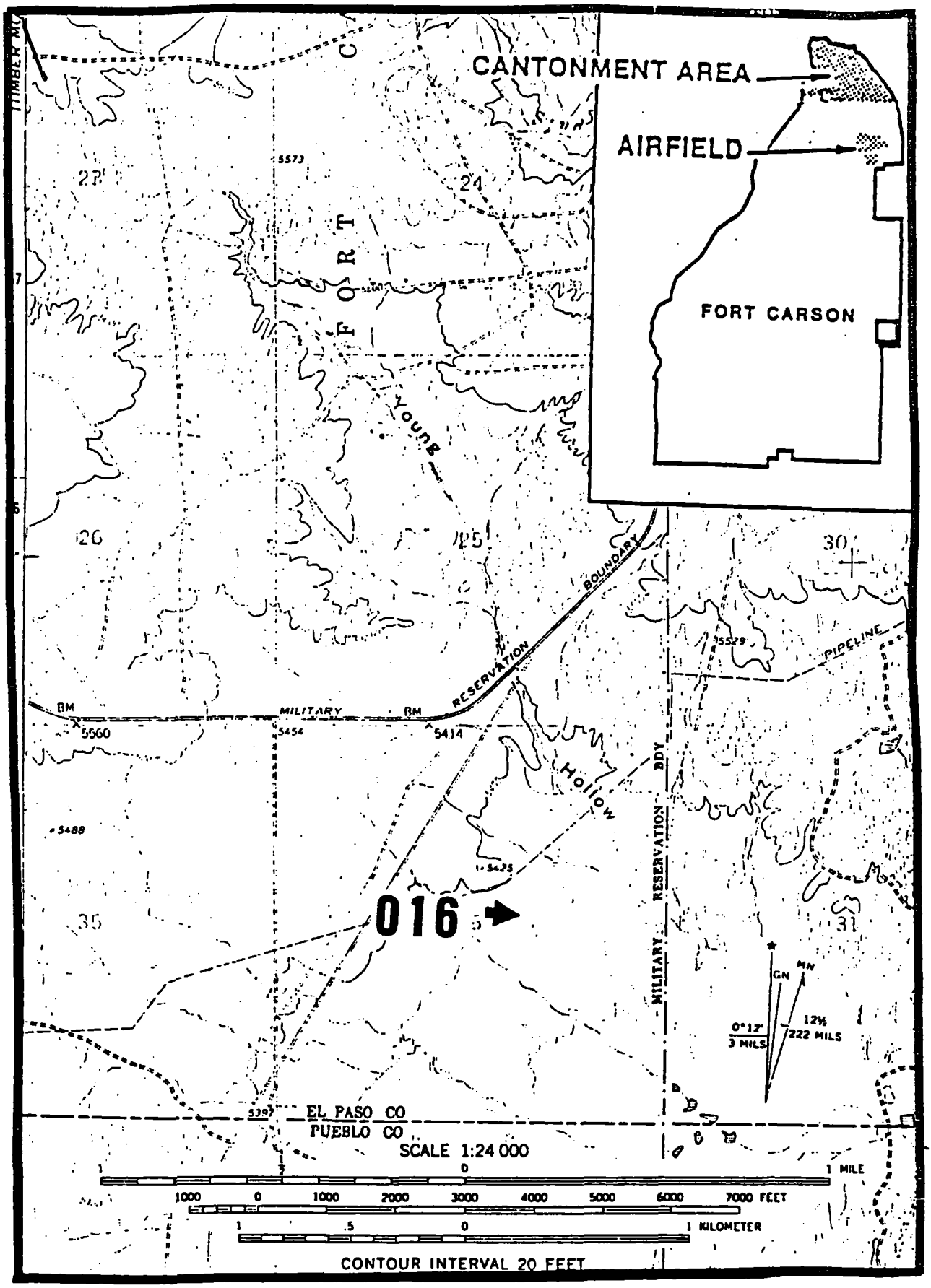


FIGURE B-14. Landfill #12, Source 12.

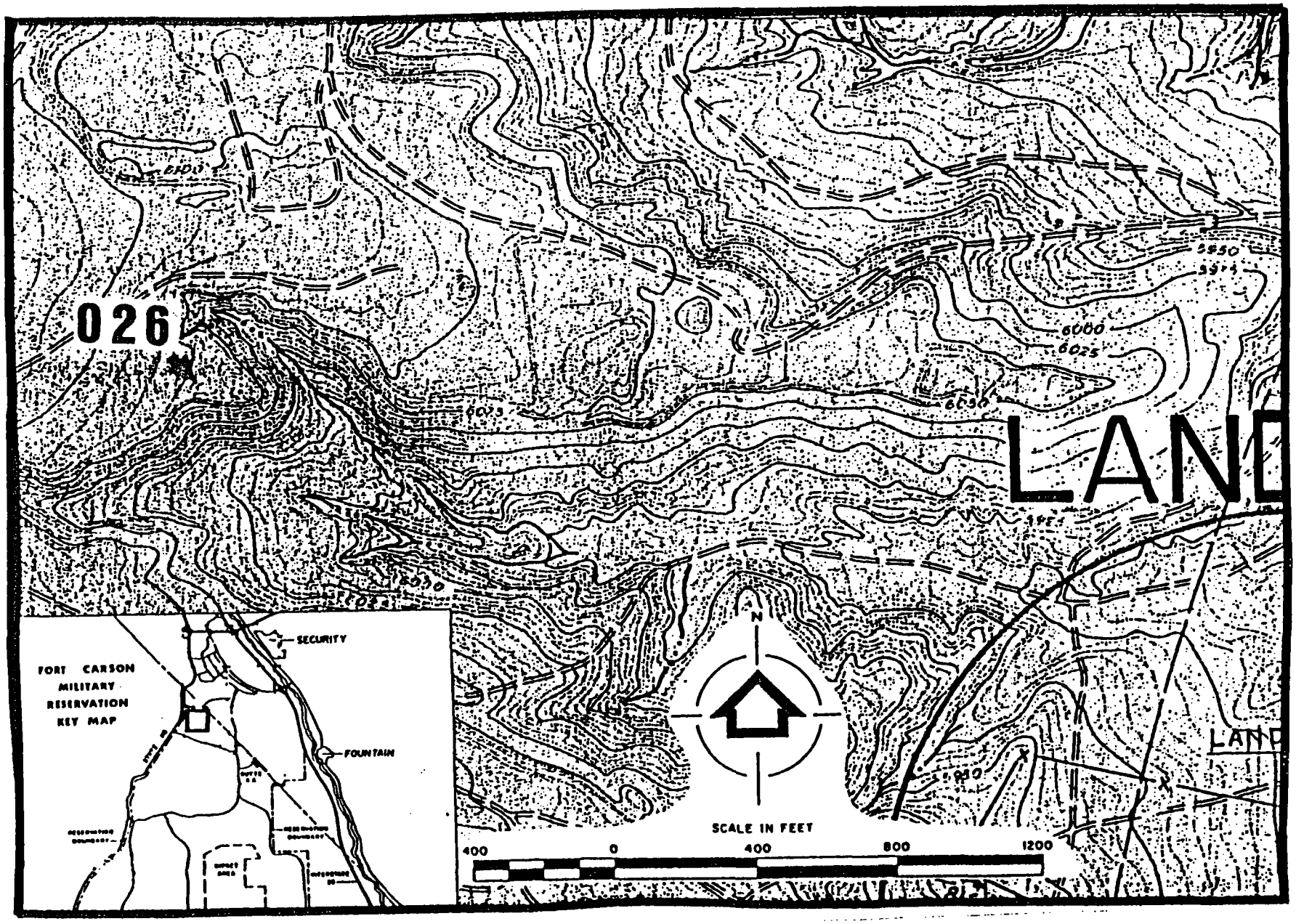


FIGURE B-32. Pete's Hill Dump, Source 13.

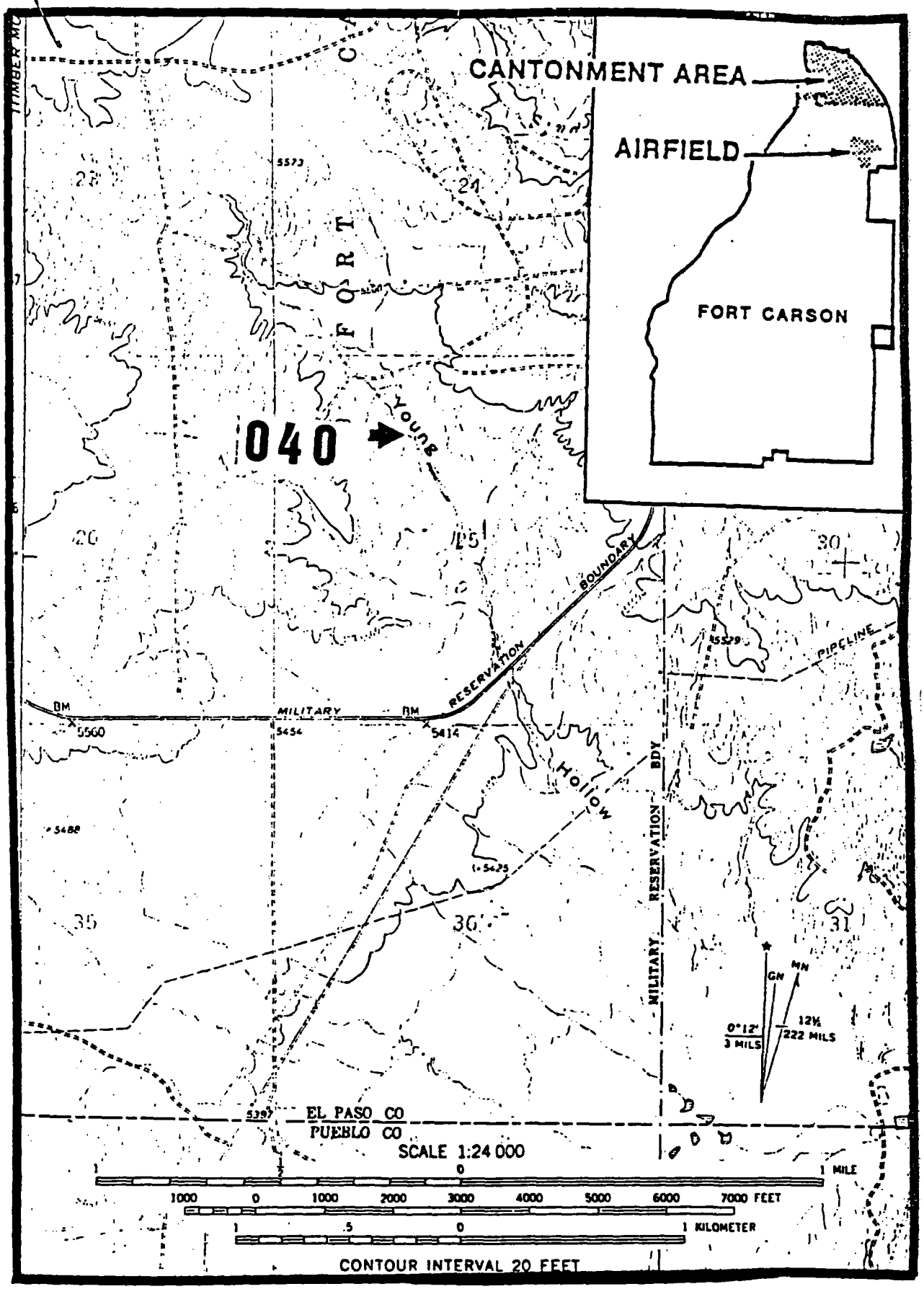


FIGURE B-46. Open Dumping Area, Range 121, Source 14.

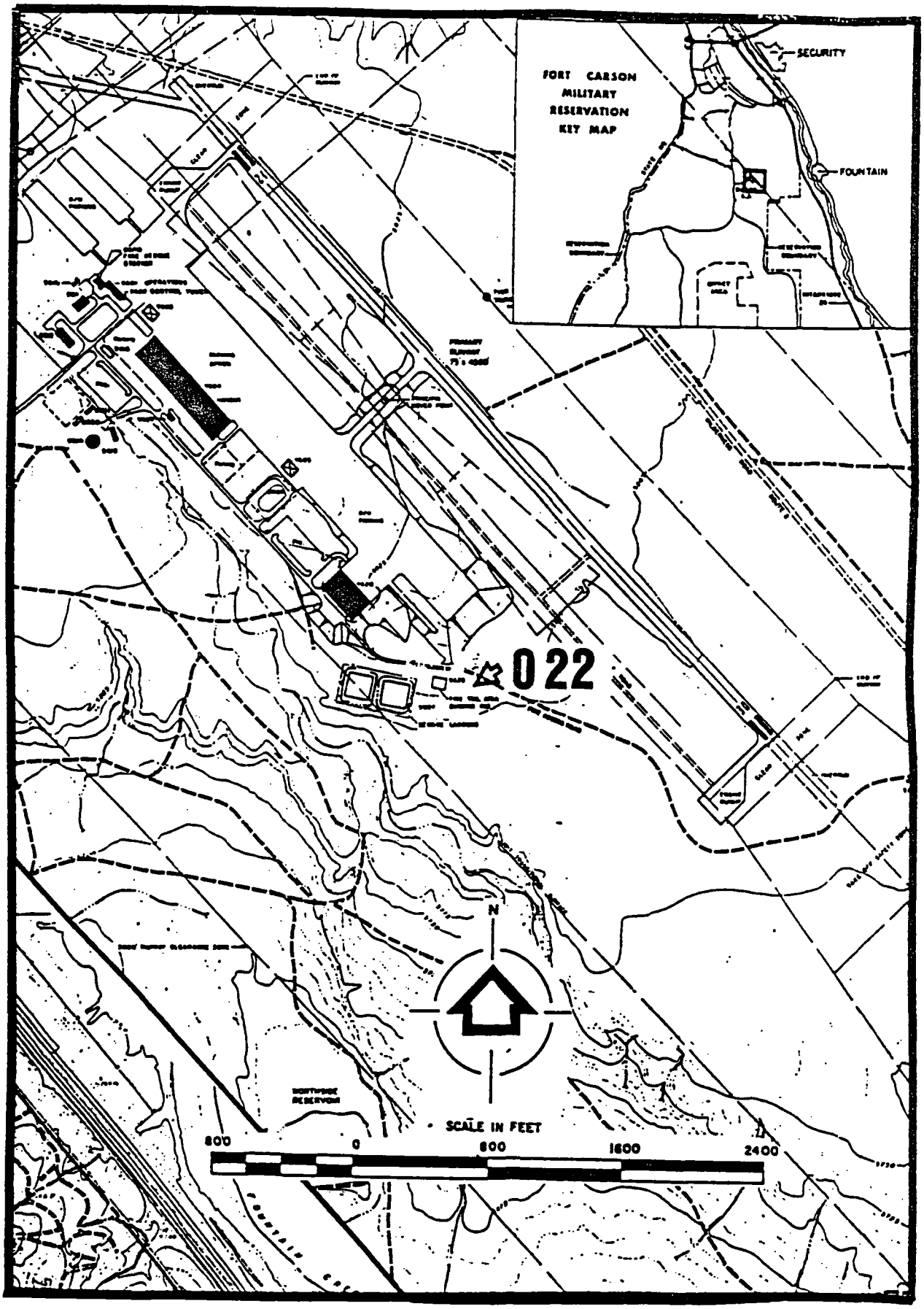
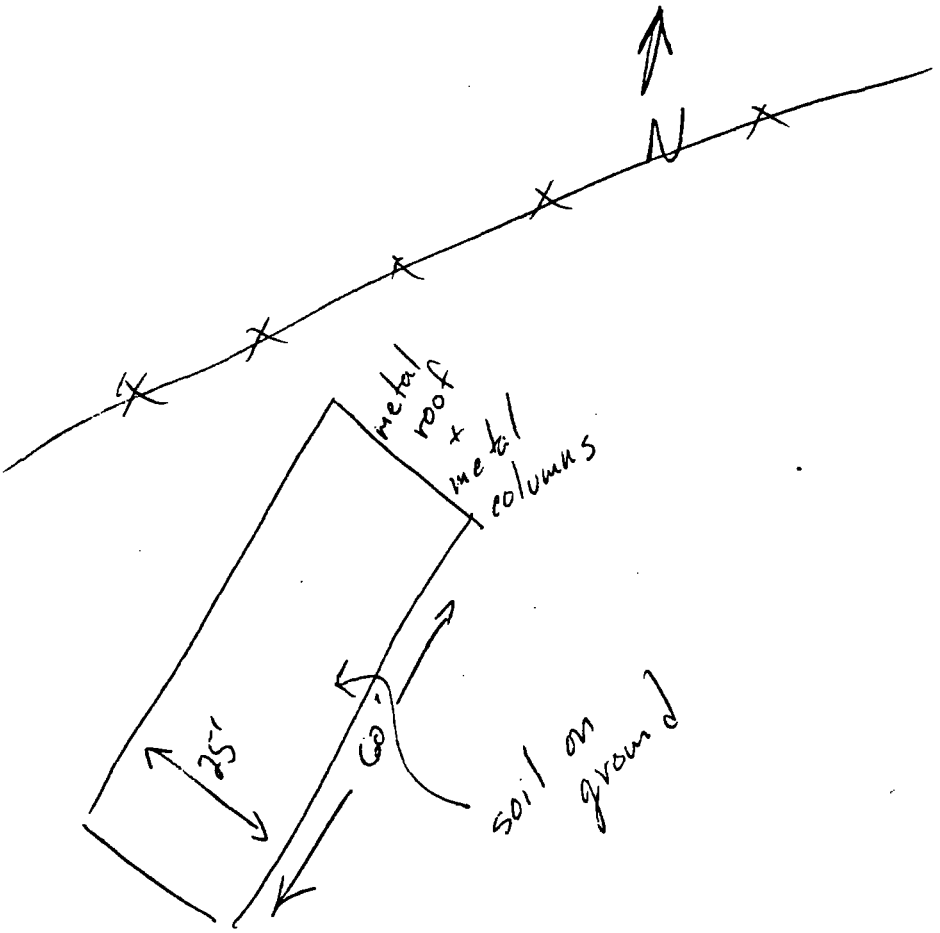


FIGURE B-20. Flammables Storage Area, Source 15.

Site Sketch
Source # 16



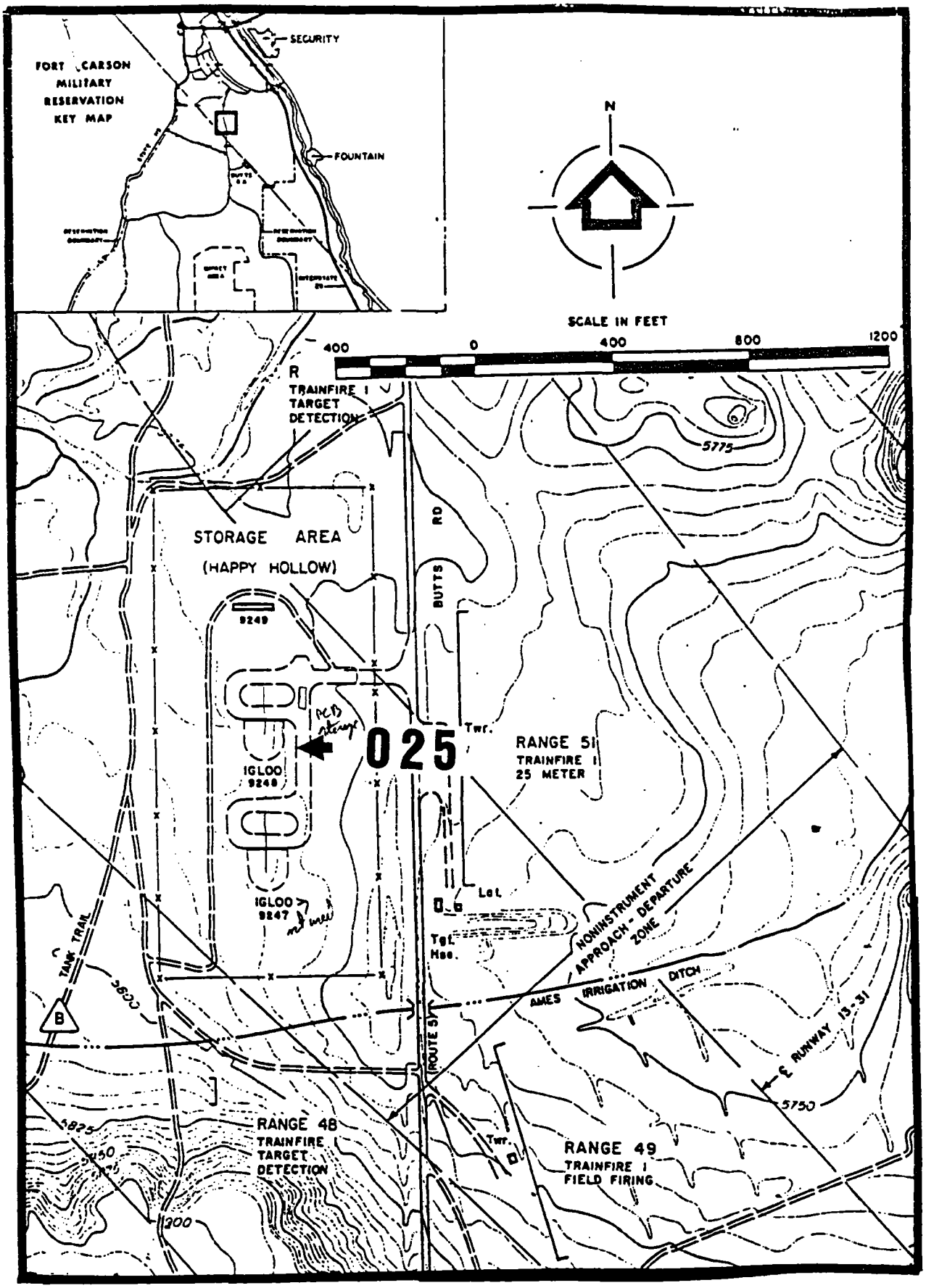
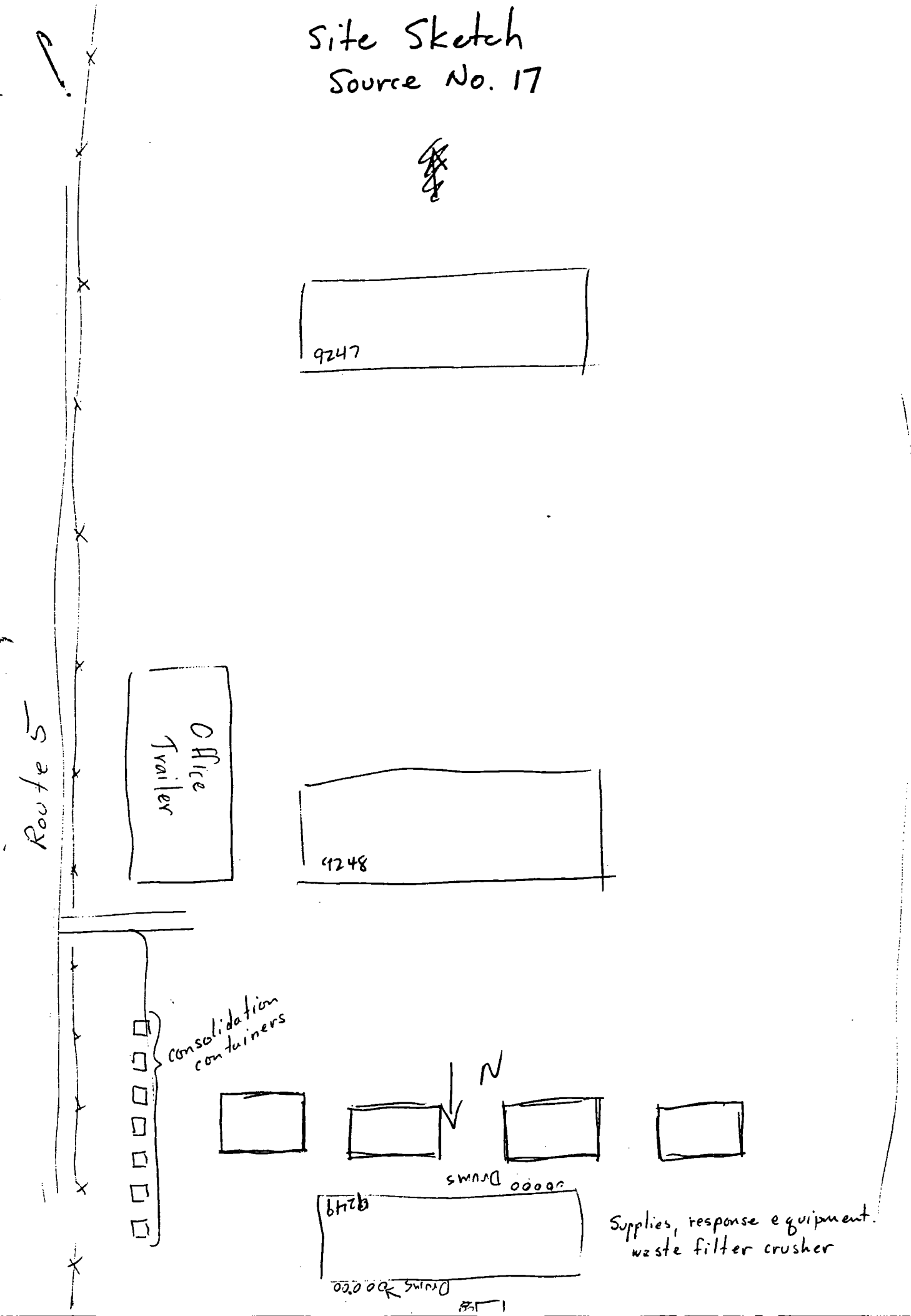


FIGURE B-31. Hazardous Waste and PCB Storage Area, Source 17.

Site Sketch
Source No. 17



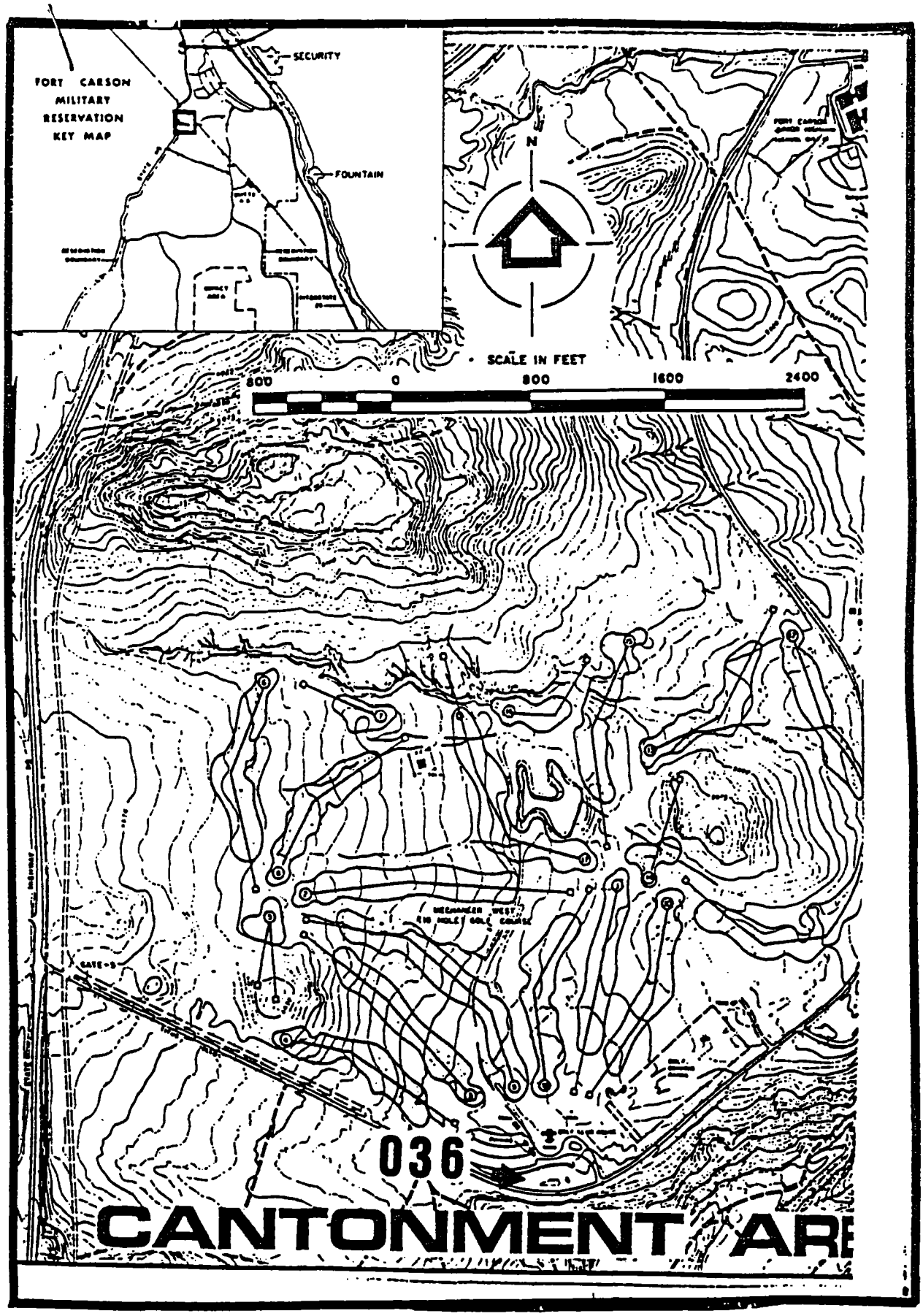
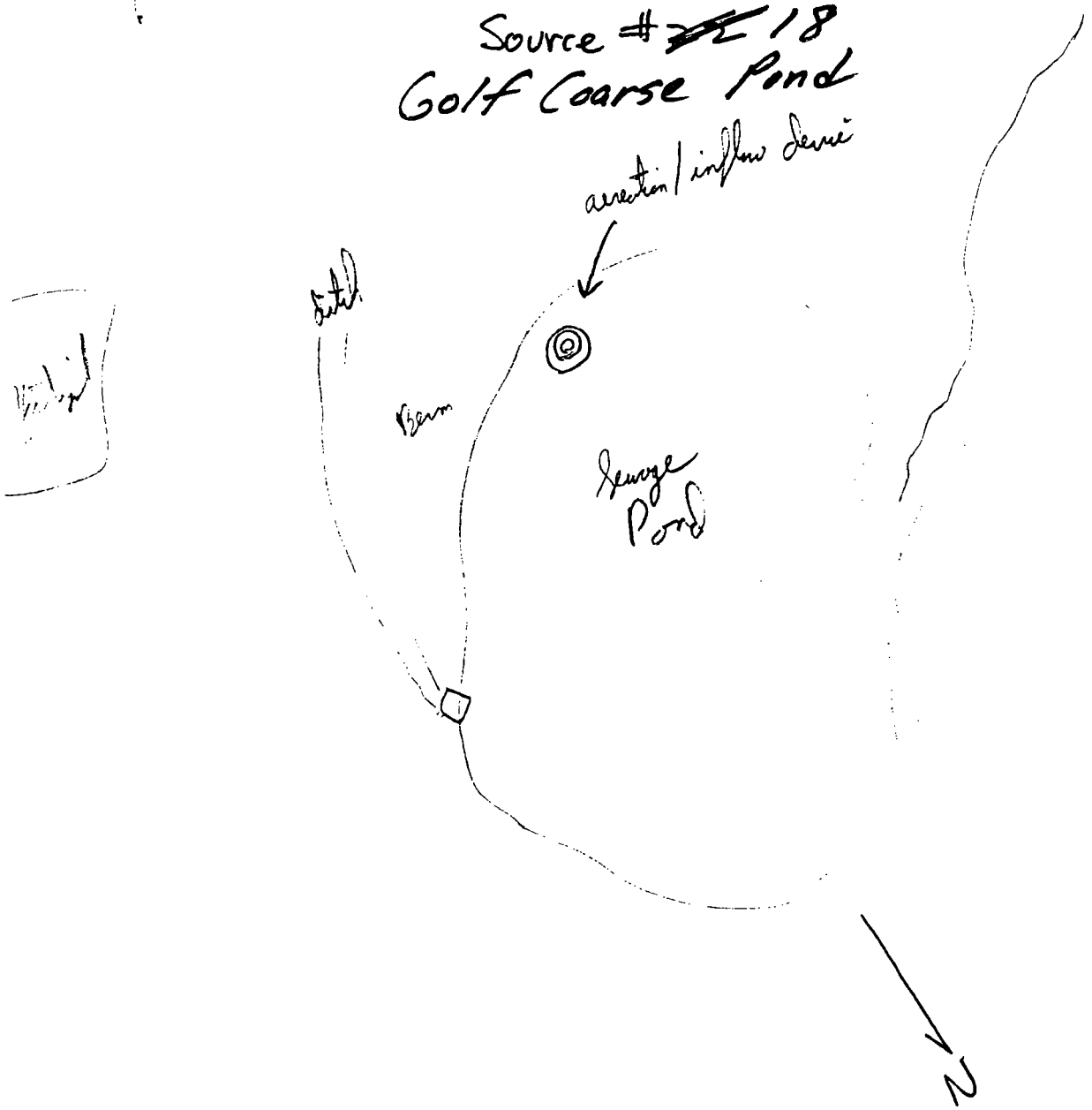


FIGURE B-42. Golf Course Holding Pond, Source 18.

Site Sketch

Source # ~~22~~ 18

Golf Course Pond



No Site Sketch for Source 19

(see Fig. 2-2 for General Location)

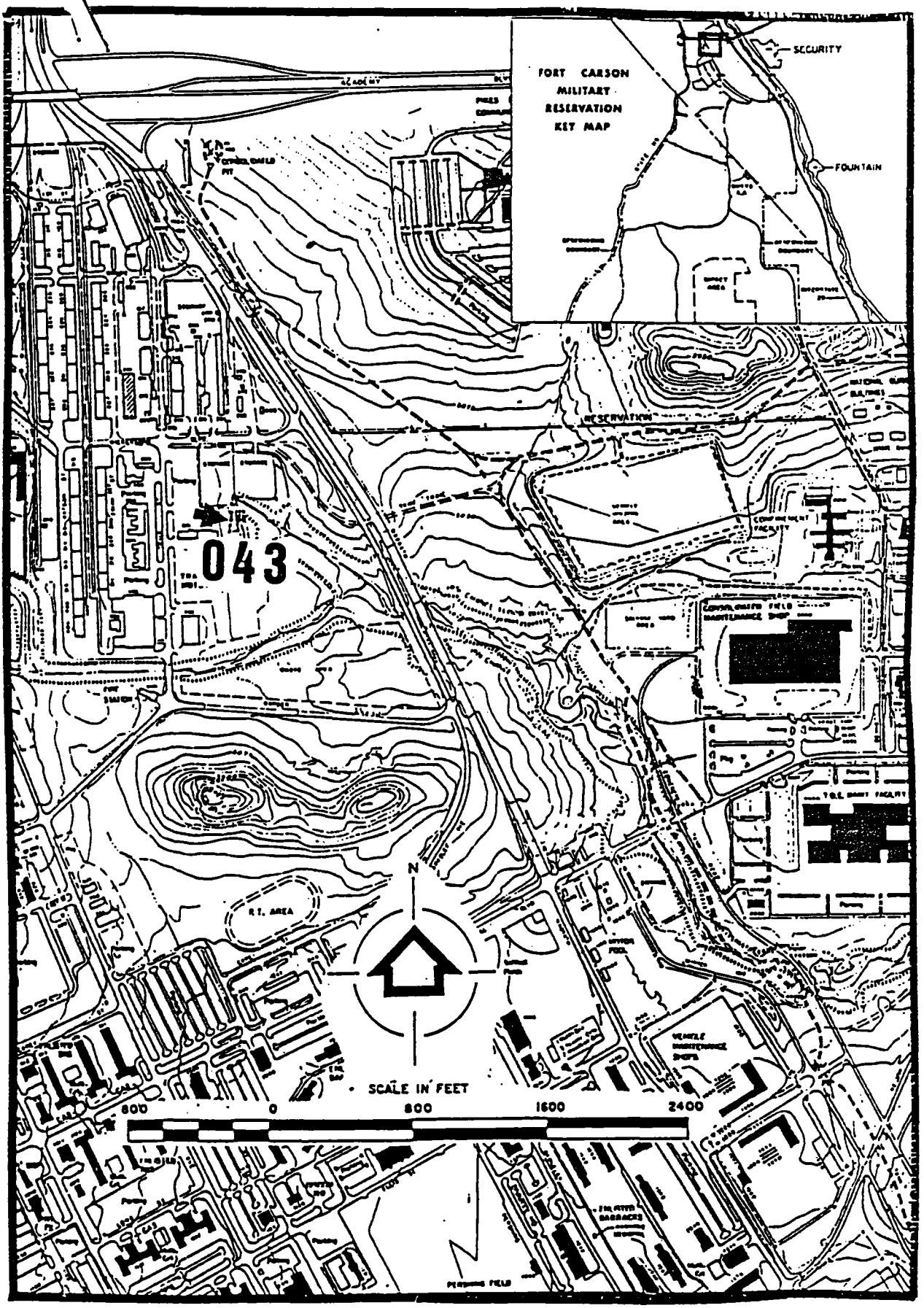
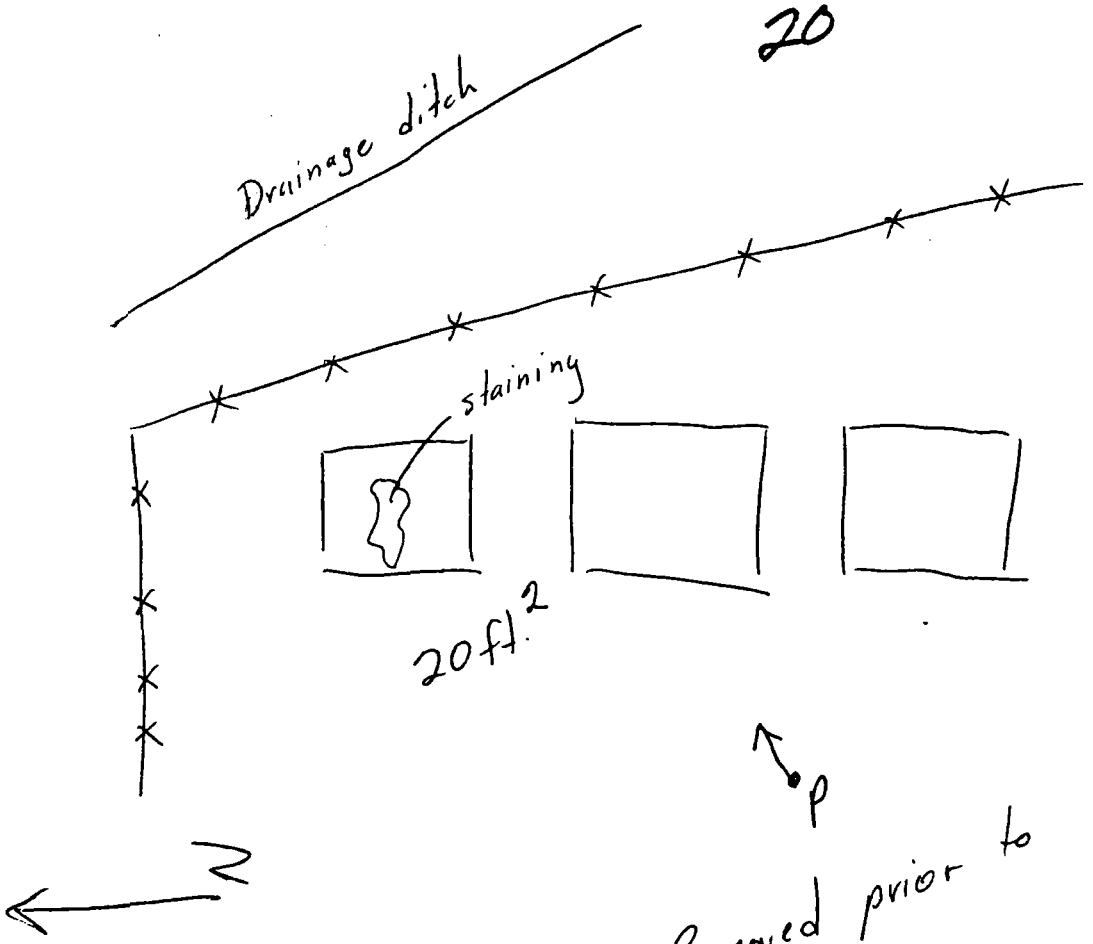
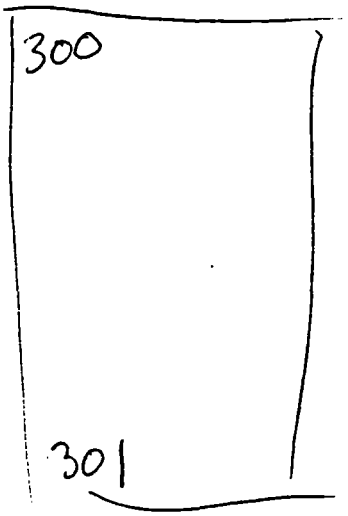


FIGURE B-49. DIO Hazardous Waste Storage, Source 20.

Site Sketch

Source No. ~~[illegible]~~ 20





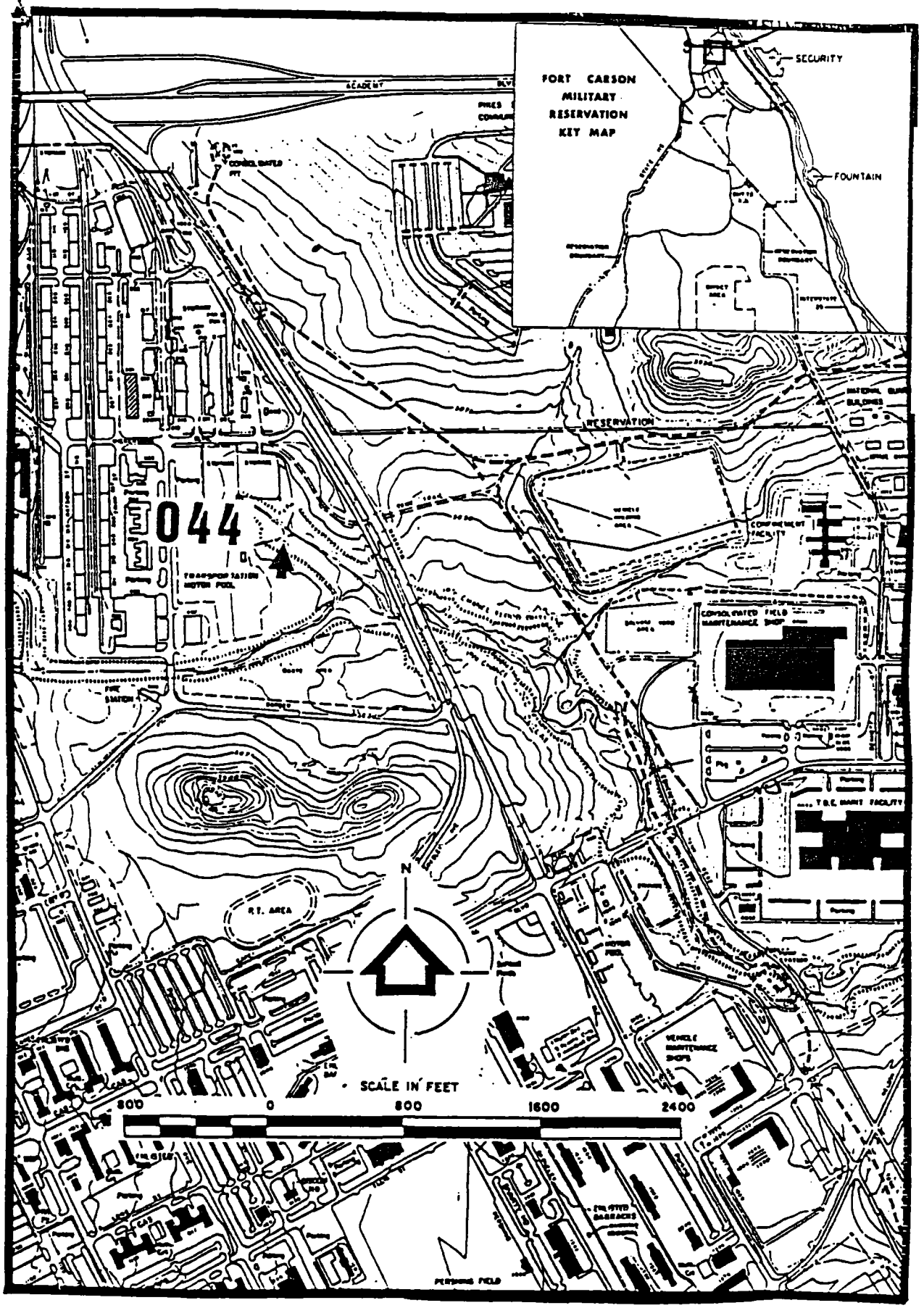


FIGURE B-50. Drainage Ditch, Adjacent to Building 301 / Source 21.

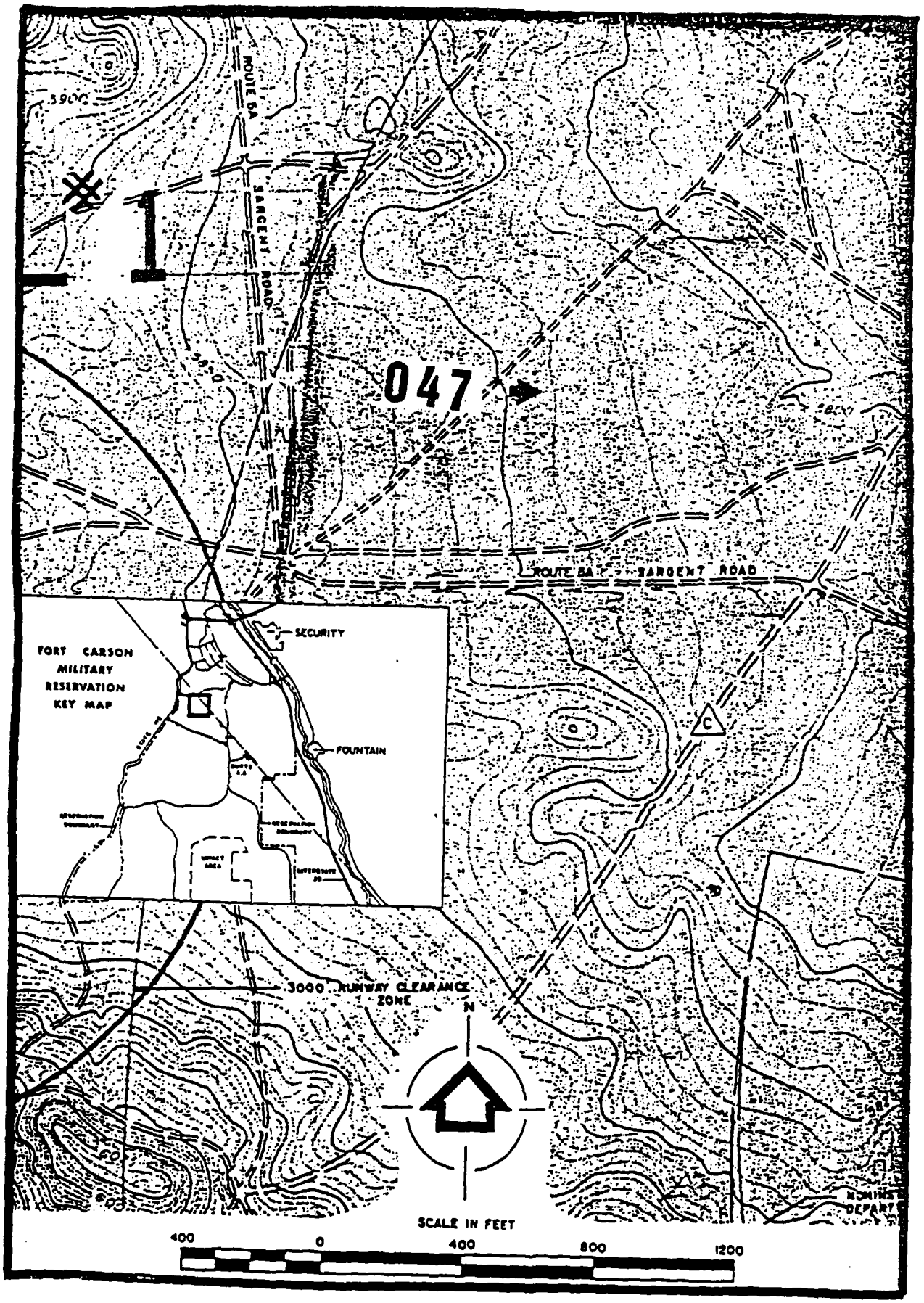


FIGURE B-53. Land Spreading Field, Source 22.

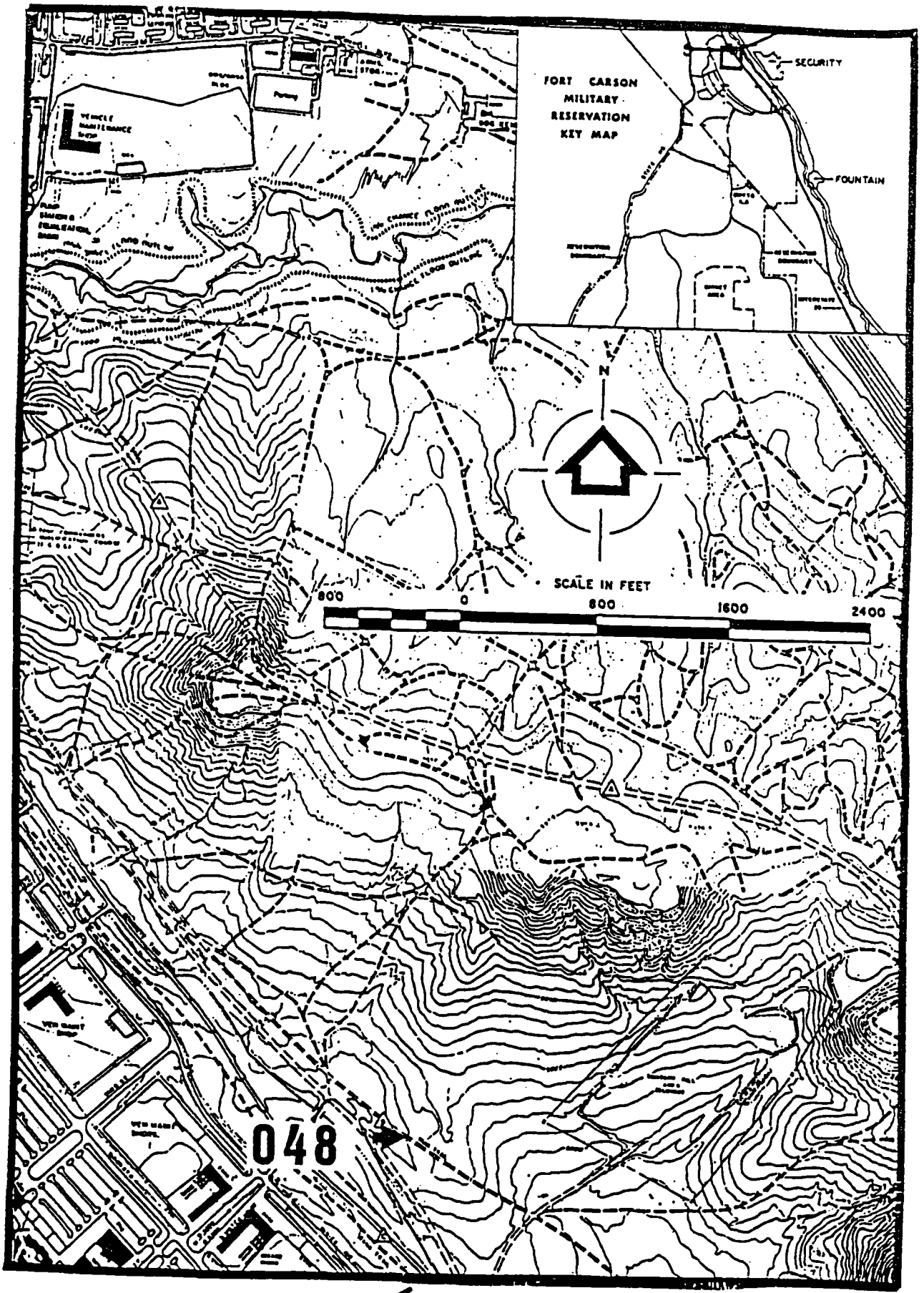


FIGURE B-54. Demolition Area, Source 23.

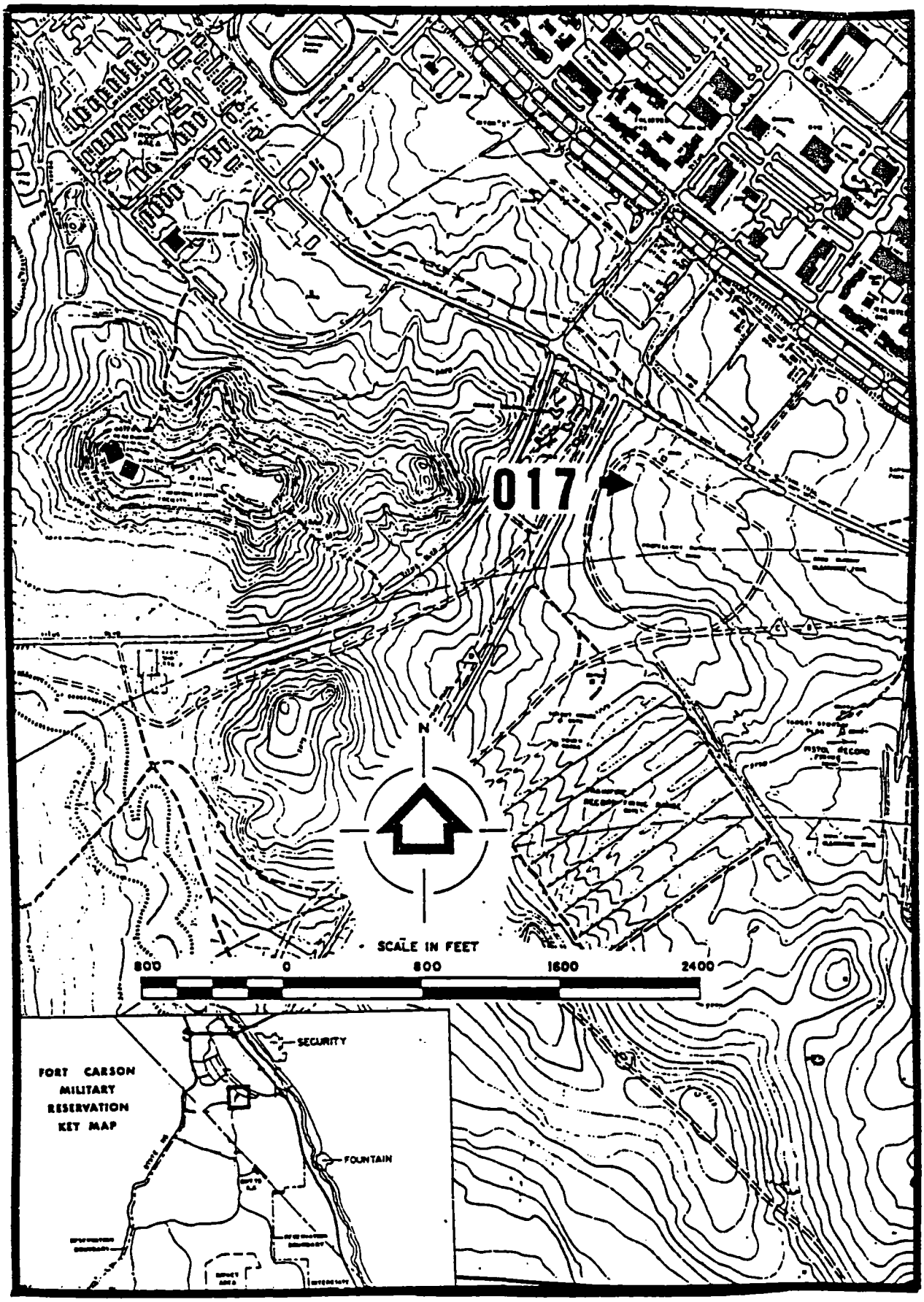
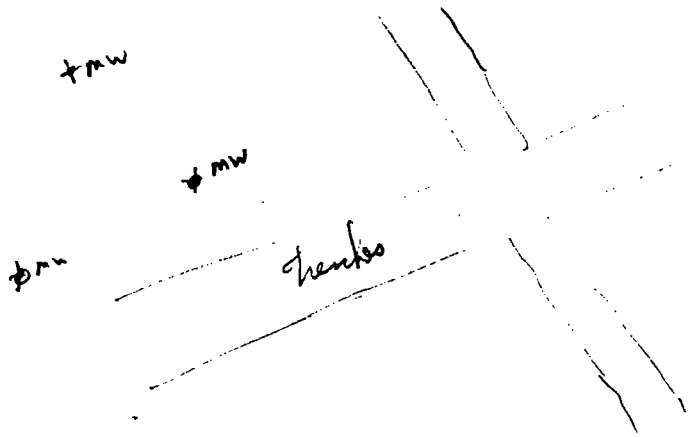


FIGURE B-15. Range 1, OB Grounds, Source 24

Site Sketch 24

Source # ~~33~~

Range 1 OB Grounds



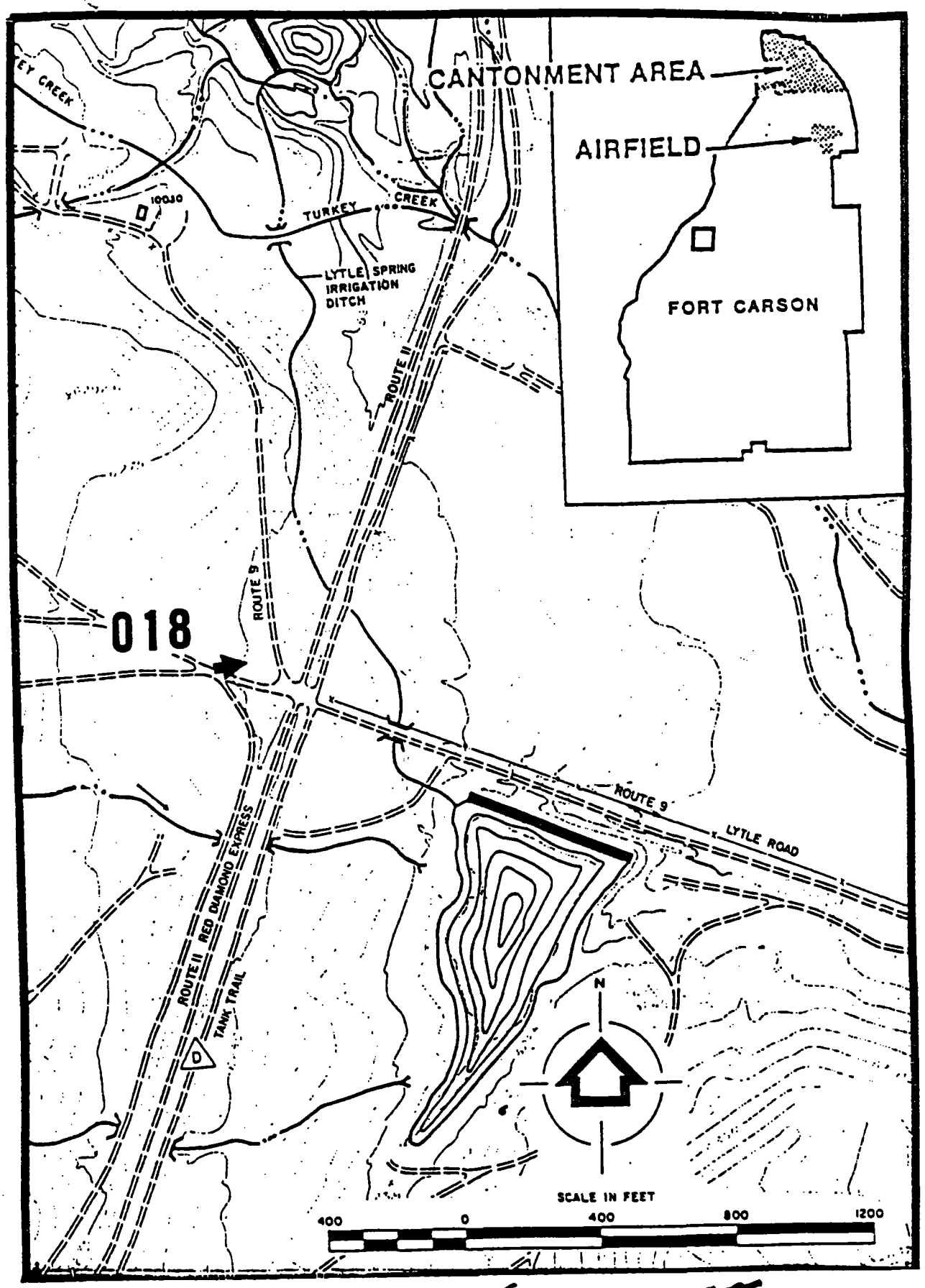


FIGURE B-16. Range 1A, OB Grounds, Source 25.

No Sketch
for Source 26.

(See Fig. 2-2 for
general location).

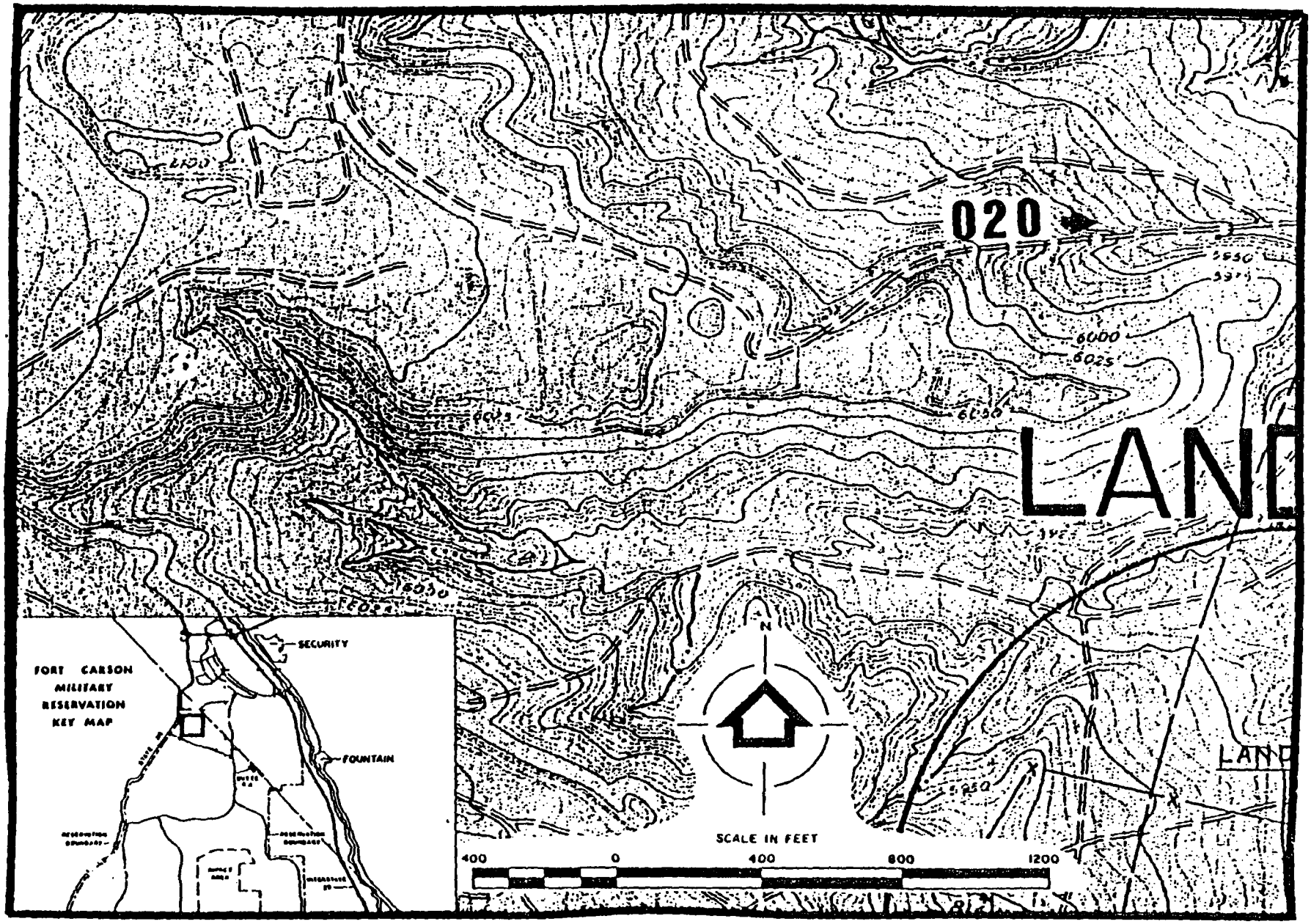


FIGURE B-18. Grit/Oil Pit, Source 27.

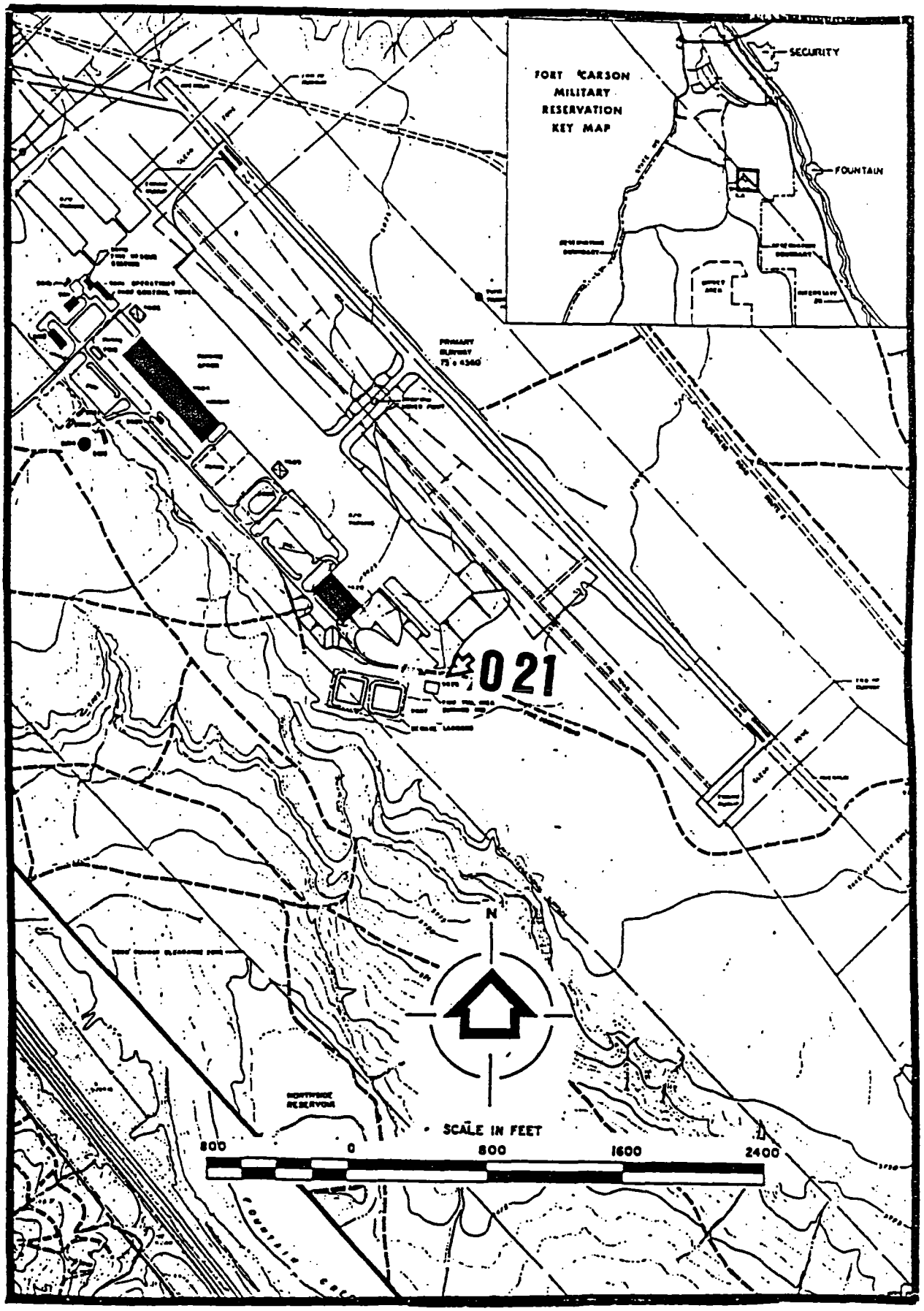
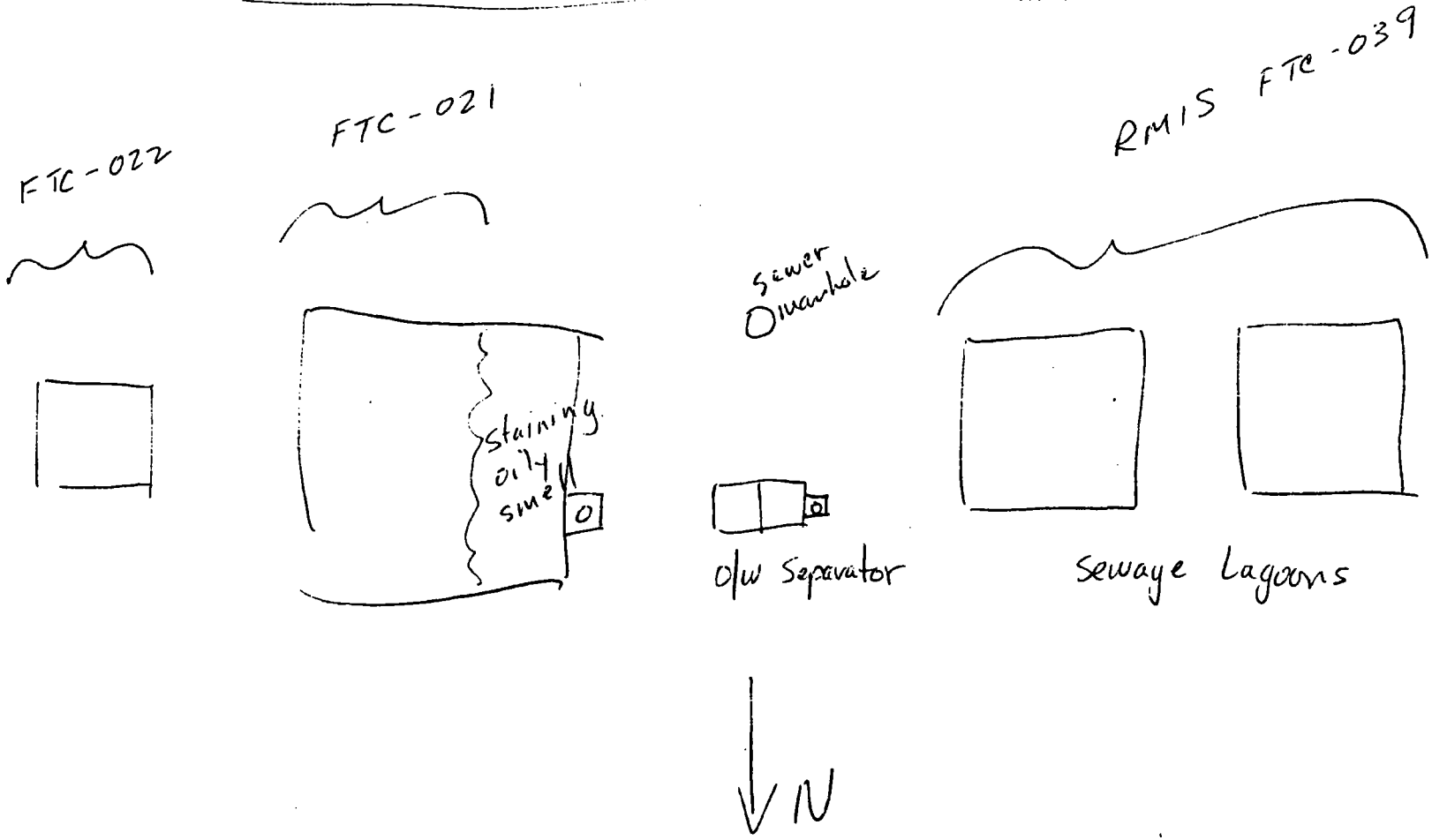


FIGURE B-19. Fire Training Site, Source 28.

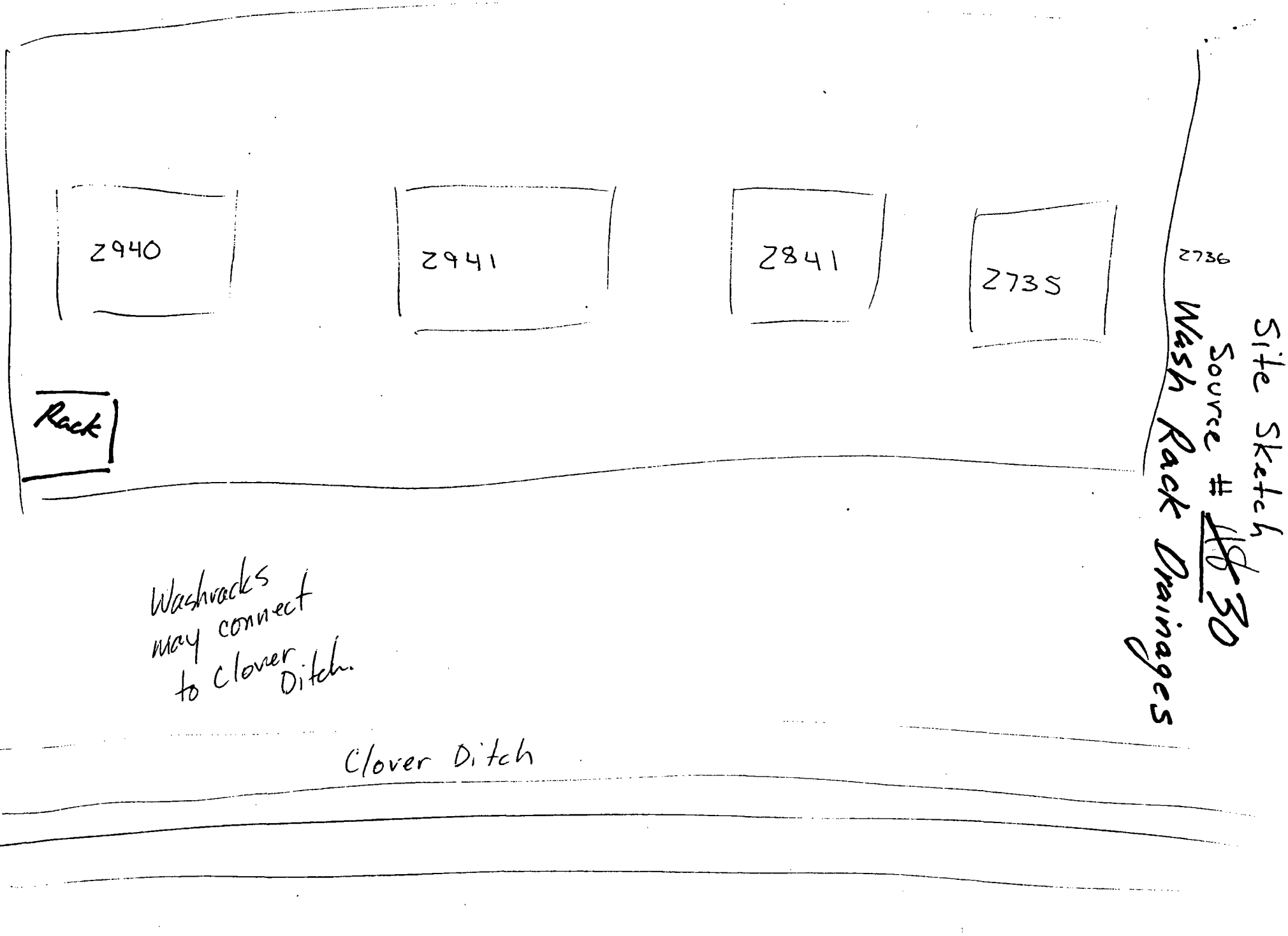
Site Sketch
Source # 27-28
Fire Training Site



No Sketch

for Source 29.

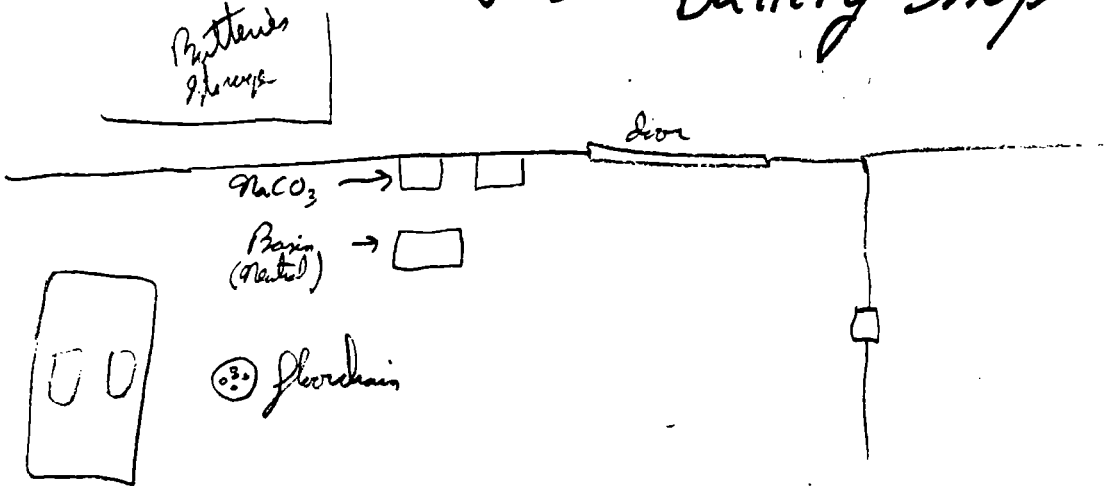
(See Fig. 2-2 for general location)


Site Sketch
Source # 4d 30
Wash Rack Drainages
2940
2941
2841
2735
2736
Rack
Washracks may connect to clover Ditch.
Clover Ditch

Site Sketch

Source # [redacted] 31

8030 Battery Shop



No Sketch

for Source 32.

(See Fig. 2-2 for general location).

No Sketch for Source 33

(See Fig 2-2 for general location)

No Source Sketch

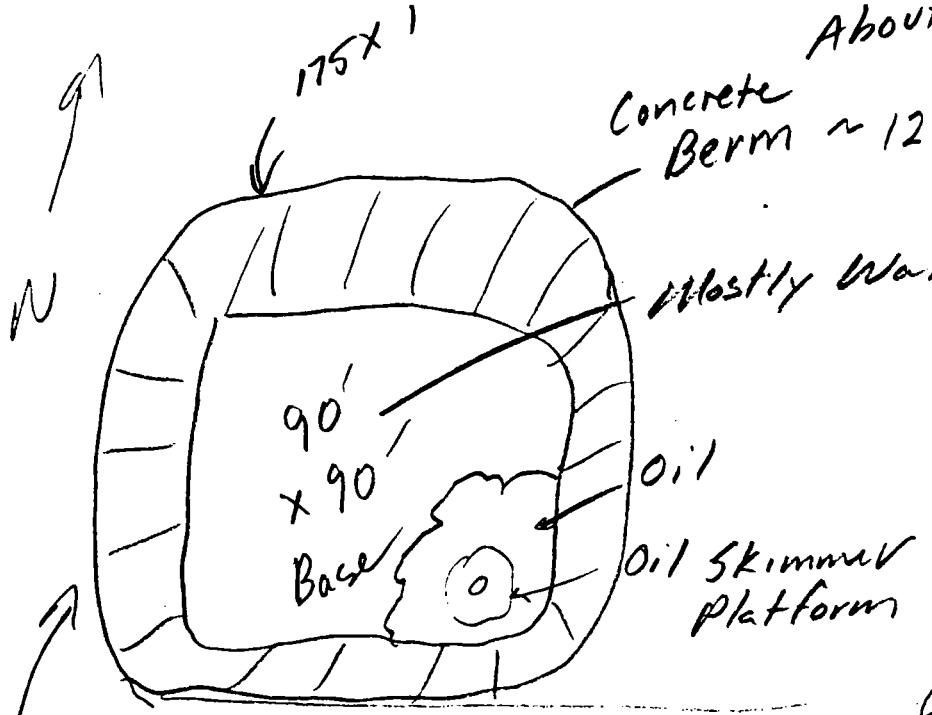
for Source 34

(See Fig 2-2 for general location).

Site Sketch

Source # ~~100~~ 35

Bldg. 1399 Equil. Basin



3-foot Clay liner under basin (R. Noyes)

Oily waste from multiple sources, mostly from oil/water separators

No Sketch
for Source 36.
(see Fig 2-2 for location)

Source ~~LF~~ 37.

Talk to DPW 2 Potential SOWDs

Corner of Ellis + Chiles (1100 Area)

N →

Chiles Ditch

Tank removal
obvious contamination in soil
aqueous + soil samples collected
Benzene detected

Source 37

→

Wetzel

construction debris containment concrete structure

600 Abrams Elem. Sch.

Chiles

No Sketch for Source 38.

(See Fig 2-2 for location)

No Sketch

for Source 39.

(See Fig 2-2 for location).

APPENDIX D

HAZARDOUS MATERIALS IN STORAGE AT SOURCE 17 DURING SITE VISIT 22-29 MARCH 1994

Record#	EPA_WASTE	WASTE_TYPE	WASTE_
1	D002	WASTE DS-2 UNUSED	
2	D002	DS-2	
3	N001	AEROSOL INSECTICIDE (D-PHENOTHRIN	
4	N001	CORROSION PREVENTATIVE COMPOUND	ALIPHATIC NAPTHA
5	H001	CORROSION PREVENTATIVE COMPOUND W	DISPLACING
6	N001	WASTE CORROSION PREVENTATIVE COMP	
7	D001	CORROSION PREVENTATIVE COMPOUND	ALIPHATIC HYDROCARBON SOLVE
8	N001	CORROSION PREVENTATIVE COMPOUND	PALE OIL
9	D001	LUBRICANT SOLID FILM (PERM-SLIK)	
10	D001	ACRYLIC LACQUER - AEROSOL	
11	D001	INSECT REPELLANT, LOTION,	'N-'N-DIETHYL-M-TOLUAMIDE
12	N001	TYPE I DEICING FLUID	
13	U069	ANTI-SIEZE COMPOUND	
14	U069	ANTI-SEIZE COMPOUND	
15	N001	ED-563 AIRCRAFT CLEANER	CLEANING COMPOUND ENGINE GA
16	N001	DEVELOPER AND REPLENISHER, PART C	GLUTARALDEHYDE
17	D007	MAGNESIUM BATTERY	
18	N001	USED GREASE	
19	D007	WHETLERITE CHARCOAL	FILTERS, NBC
20	D006	USED NI-CAD BATTERIES	
21	D002	USED NICAD BATTERIES	
22	D008	PAINT CANS, LEAD CONTAMINATED	
23	D001	WASTE CARC PAINT, PART B	
24	D001	WASTE CARC PAINT, COMPONENT A	
25		NILES CHEMICAL PAINT	
26	N001	WASTE CLEANING SOLVENT	TRICHLORO-TRIFLUOROETHANE
27		WASTE, SOLVENT	
28		ASBESTOS, BRAKE SHOES	
29	N001	USED BRAKE SHOES ASBESTOS LINED	
30	D007	WASTE MAGNESIUM BATTERIES	
31	D007	USED WHETLERITE FILTERS	
32		LATEX PAINT	
33	N001	WASTE LATEX PAINT	
34	D007	WASTE MAGNESIUM BATTERIES	
35		MAGNESIUM BATTERIES	
36	D002	POTASSIUM HYDROXIDE SOLUTION	
37	D001	SODIUM HYDROXIDE SOLUTION	
38	N001	CHLORAPHENICOL SOLUTION	
39	D001	ETHYLENE OXIDE	
40	D005	BARIUM CHLORIDE	
41	D001	PH INDICATOR	
42	D002	SULFURIC ACID	
43	D002	HYDROCHLORIC ACID	
44	D002	ORTHOTOLIDINE SOLUTION	
45	D002	SPADNS FLOURIDE TEST REAGENT CAT	
46	D002	SILVER NITRATE STANDARD	
47	D002	MERCURY	
48	F002	HYDRAULIC OIL	
49	D001	WASTE PAINT REMOVER	
50	N001	CORROSION INHIBITOR, CRYSTAL	
51	D008	ANTI-SIEZE COMPOUND	
52	D007	CORROSION RESISTANT COATING, PRE-	
53	NONE	CARBON REMOVER	
54	U002	SEALING COMPOUND, ACETONE	

55	D001	CORROSION PREVENTATIVE COMPOUND,	
56	D001	CORROSION PREVENTATIVE COMPOUND	
57	U226	PRIMER T-FORM R	
58	N001	SEALING COMPOUND	
59	N001	CLEANING AND LUBRICATING COMPOUND ELECTRICAL CONTACT	
60	NONE	LUBE OIL, EXPOSED GEAR	
61	N001	SEALING COMPOUND, PART A	
62	N001	CORROSION INHIBITOR, LIQUID	COOLING
63	N001	WASTE SEALING COMPOUND PART B	
64	D001	WIGHT'S STAINING SOLUTION	(METHYL ALCOHOL)
65	N001	TRU-TAR BATH OIL	
66	N001	SODA-SORB ABSORBENT	
67	U248	WARFARIN TABLETS (5MG)	
68	U080	PAINT REMOVER	
69	D001	CARC PAINT PART A	
70	D		
71	D001	CARC PAINT, COMPONENT B	
72	D001	WASTE SEALING COMPOUND	
73	N001	SEALING COMPOUND	
74	D001	DEICING-DEFROSTING FLUID	
75	D001	DIESEL ENGINE STARTING FLUID	
76	N001	INSECTICIDE, D-PHENOTHRIN 2%	
77	N001	CLEANING COMPOUND SOLVENT	
78	D001	WASTE, TOLUENE	
79	D001	WASTE, (PETROLEUM BASED) CORRO-	SION PREVENTIVE COMPOUND
80	D001	LUBRICANT, SOLID FILM	
81	D001	NAL NAPTHA ALIPHATIC	
82	N001	DEGREASER, AIRCRAFT, AIR SHOW GEL	
83	D001	CARC PAINT	
84	D001	M256 KITS	
85	D007	MAGNESIUM BATTERIES	
86	D018	SILICONE BRAKE FLUID	
87	D007	WHETLERITE FILTERS	
88	N001	LIGHT BALLASTS WITH PCB'S	
89	D001	M258 KITS, NBC, PERSONAL DECON	
90	D003	LITHIUM BATTERIES	

APPENDIX E

FORT CARSON UNDERGROUND AND ABOVEGROUND STORAGE TANKS

APPENDIX E

FORT CARSON STORAGE FACILITIES

(see Map 2a for building location)

STORAGE TANKS						
Unit or Activity	Bldg. No.	Substance	Underground Capacity*	Total Underground Capacity*	Aboveground Capacity*	Total Aboveground Capacity*
1	211	MOGAS	–	–	600	600
2	218	Waste Oil	600	600	–	–
3	227	Waste Oil	–	–	200	200
4	240	Kerosene Stoddard Solvent	– –	–	2,000 2,000	4,000
5	301	MOGAS Diesel Fuel	– –	–	600 600	1,200
6	319	MOGAS	–	–	600	600
7	403	Fuel Oil	17,500	17,500	–	–
8	515	Waste Oil	400	400	–	–
9	633	Fuel Oil	12,000	12,000	–	–
10	635	Waste Oil	2,000	2,000	–	–
11	638	Diesel Oil MOGAS Kerosene	10,000 10,000 –	20,000	– – 400	400
12	749	Diesel MOGAS Waste Oil Storm Drain Ethylene Glycol	20,000 10,000 4,000 750 –	34,750	– – – – 1,000	1,000
13	1001	Waste Oil	–	–	600	600
14	1302	Waste Oil	1,000	1,000	1,000	1,000
15	1382	Waste Oil	1,000	1,000	–	–
16	1392	Diesel Fuel Waste Oil	60,000 1,000	61,000	– 800	800
17	1399	Diesel Waste Oil	300 –	300	400 61,200	61,600
18	1404	Waste Oil	700	700	–	–
19	1430	Diesel	550	550	–	–
20	1515	MOGAS Waste Oil	30,000 1,000	51,000	– –	–

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STORAGE TANKS						
Unit or Activity	Bldg. No.	Substance	Underground Capacity*	Total Underground Capacity*	Aboveground Capacity*	Total Aboveground Capacity*
21	1682	Diesel Fuel Waste Oil	60,000 1,000	61,000	– 1,200	1,200
22	1692	MOGAS Diesel Fuel Waste Oil	20,000 40,000 1,600	61,600	– – –	–
23	1860	Fuel Oil Waste Oil	126,000 –	126,000	280,000 120,000	400,000
24	1882	Diesel Waste Oil	60,000 2,000	62,000	– –	–
25	1982	Diesel Fuel Waste Oil	60,000 1,000	61,000	– 400	400
26	2082	Diesel Fuel Waste Oil	60,000 2,000	62,000	– 2,400	2,400
27	2392	Diesel Fuel Waste Oil	60,000 1,000	61,000	– 2,400	2,400
28	2427	Waste Oil	–	–	2,200	2,200
29	2434	Waste Oil	600	600	1,600	1,600
30	2492	Diesel Fuel Waste Oil	60,000 1,000	61,000	– 1,200	1,200
31	2692	Diesel Fuel Waste Oil	60,000 1,000	61,000	– –	–
32	2735	Waste Oil	1,500	1,500	400	400
33	2792	Diesel Fuel Waste Oil	40,000 1,000	41,000	– 2,400	2,400
34	2840	Waste Oil	1,500	1,500	–	–
35	2848	Waste Oil	–	–	400	400
36	2940	Waste Oil	1,500	1,500	–	–
37	2946	Waste Oil	–	–	400	400
38	2992	Diesel Fuel Waste Oil	60,000 2,600	62,600	– –	–
39	3092	Diesel Fuel Waste Oil	60,000 1,000	61,000	– 1,200	1,200
40	3192	Diesel Fuel Waste Oil	60,000 1,000	61,000	– 1,400	1,400

APPENDIX E

STORAGE TANKS						
Unit or Activity	Bldg. No.	Substance	Underground Capacity*	Total Underground Capacity*	Aboveground Capacity*	Total Aboveground Capacity*
41	3292	MOGAS Diesel Fuel Waste Oil	20,000 40,000 2,000	62,000	– – 1,400	1,400
42	3488	Waste Oil	–	–	600	600
43	3709	Waste Oil	–	–	500	500
44	3750	Waste Oil	–	–	2,000	2,000
45	3868	Diesel Fuel	2,000	2,000	–	–
46	3874	Waste Oil	1,000	1,000	–	–
47	3887	Aluminum Sulfate	–	–	10,000	10,000
48	6229	Diesel Fuel	2,000	2,000	–	–
49	6288	Diesel Fuel Fuel Oil	4,000 200,000	204,000	1,750 –	1,750
50	7500	Diesel Fuel	4,000	4,000	16,000	16,000
51	7800	MOGAS Diesel Fuel	1,000 –	1,000	1,000 1,000	2,000
52	8000	MOGAS Diesel Fuel Waste Oil Fuel Oil New Lube Oil Solvent	8,000 8,000 25,600 20,000 9,000 25,600	96,200	250 250 3,600 – – 500	4,600
53	8010	Diesel Fuel	2,900	2,900	–	–
54	8030	Waste Oil	–	–	4,800	4,800
55	8098	Diesel Fuel Waste Oil	– –	–	500 1,000	1,500
56	8142	Diesel Fuel Waste Oil	40,000 1,000	41,000	– –	–
57	8152	MOGAS Diesel Fuel Waste Oil	20,000 40,000 1,000	61,000	– – 1,000	1,000
58	8200	Diesel Fuel MOGAS Waste Oil	60,000 20,000 3,000	83,000		

APPENDIX E

STORAGE TANKS						
Unit or Activity	Bldg. No.	Substance	Underground Capacity*	Total Underground Capacity*	Aboveground Capacity*	Total Aboveground Capacity*
59	8300	Diesel MOGAS Waste Oil Ethylene Glycol	60,000 20,000 2,000 1,000	83,000	– – – – –	–
60	8472	MOGAS Diesel Waste Oil	5,000 8,000 –	13,000	– – 300	300
61	8930	Waste Oil	1,000	1,000	–	–
62	9072	MOGAS Diesel Fuel Waste Oil	20,000 40,000 2,000	62,000	– – –	–
63	9300	Fuel Oil	–	–	2,500	2,500
64	9602	Diesel	700	700	–	–
65	9603	Waste Oil	450	450	–	–
66	9606	JP-4 Waste JP-4 Waste Oil	100,000 500 500	101,000	– – –	–
67	9609	Fuel Oil	60,000	60,000	–	–
68	9610	Diesel Fuel	500	500	–	–
69	9613	Diesel Fuel	600	600	–	–
70	9620	Fuel Oil	17,400	17,400	–	–
71	9628	Diesel MOGAS Waste Oil Ethylene Glycol	24,000 6,000 4,000 –	34,000	– – – – 2,000	2,000
72	9642	MOGAS Waste Oil	– –	–	100 800	900
73	9649	Fuel Oil	–	–	1,000	1,000
74	10013	MOGAS	–	–	500	500
75	12000	Fuel Oil	–	–	500	500
76	12001	Fuel Oil	–	–	500	500
77	12008	Fuel Oil	–	–	275	275
78	12010	Fuel Oil	275	275	–	–

APPENDIX E

STORAGE TANKS						
Unit or Activity	Bldg. No.	Substance	Underground Capacity*	Total Underground Capacity*	Aboveground Capacity*	Total Aboveground Capacity*
79	12011	MOGAS Diesel Fuel	-- --	--	600 600	1,200

*All capacities in U.S. gallons.

HAZARDOUS WASTE STORAGE SITES ~~12/2/91~~3/1/94		
Unit or Activity	Bldg. No.	HWSAP Operator
1	9072	4th Engineers
2	5~~1~~501	124 Signal
3	749	104th Military intelligence
4	1682	1/3rd Air Defense Artillery
5	8110	Mobilization Training Equipment Site (# 64)
6	Range 145	Range Control, Downrange
7	Range 123	Air Burst Range Control, Buckley Air National Guard, Downrange
8	MPRC	Range Control, Multi Purpose Range Complex, Downrange
9	~~24333~~669	Aviation Maintenance~~Auto~~ Shop, Pikes Peak Community College
10	7501	Hospital Maintenance Contractor & MEDDAC
11	8007	Force Integration Vehicle Storage Branch
12	1302	Directorate of Engineering and Housing Maintenance
13	NCFS	Naval Construction Forces (SEEBEES), Downrange
14	8030	704th Maintenence Support Battalion (MSB), Company C, D, & E
15	~~80308~~300	704th Maintenance Support Battalion (MSB)~~704th MSB, Company E~~
16	~~8030~~401	~~704th MSB, Company A~~704th MSB, Company A (Class II & IV)
17	1692	5/29th Field Artillery & 172nd Chemical Company
18	~~19928~~113	~~172nd Chemical Company~~CMS # 5
19	8930	U.S. Army Reserve Center, Equipment Concentration Site , #42
20	8030	64th Forward Support Battalion, Company B
21	1882	31st Chemical Company & 3/29 Field Artillery
22	18~~9~~82	Battery C, MLRS, 10th Field Artillery, Battery A, 26th FA

APPENDIX E

HAZARDOUS WASTE STORAGE SITES ~~12/2/91~~3/1/94		
Unit or Activity	Bldg. No.	HWSAP Operator
23	~~27~~692	1/12th Infantry Battalion
24	2992	2/12th Infantry Battalion
25	3092	3/68th Armor Battalion
26	8200	64th Forward Support Battalion
27	1382	4th Forward Support Battalion
28	27~~3~~492	HHC 1st Brigade & Log School Generator Shop
29	2946	HHC, 3rd Brigade
30	2392	1/8th Infantry Battalion
31	2492	2/77th Armor Battalion
32	2082	2/35th Armor Battalion
33	9628	1/4th Aviation Battalion (AVN), ~~4/4th AVN, Co F, 2/158th Air~~
34	~~9628515~~	~~4/4th AVN~~AAFES Gas Station
35	~~9628207~~	~~4th AVN, Company F~~Paint Shop
36	~~96282496~~	~~2/158th Air~~ HHC 3rd Brigade
37	9604	4th AVN, Company F, 1/10 Cav, Co E, Medical Detachment
38	~~9604633~~	~~2/7th Cavalry, Company E~~10th CASH
39	~~9604634~~	~~Medical Detachment~~4 SSB
40	9620	1/4th AVN
41	8152	360th Transportation Battalion
42	~~81528030~~	~~50th Ordnance Company~~4th FSB, Company A
43	8152	10th Mobile Army Surgical Hospital & 73rd Trans Battalion
44	~~81521982~~	~~73rd Transportation Battalion~~HHB DIVARTY
45	8142	183rd Maintenance Battalion
46	3292	~~52nd Engineer Battalion~~299th Engineer Battalion
47	3488	52nd Engineer Battalion
48	635	759th Military Police
49	8000	Directorate of Logistics
50	342	Defense Reutilization and Marketing Office
51	~~7804~~	~~Golf Course Maintenance Shop~~

APPENDIX E

HAZARDOUS WASTE STORAGE SITES ~~12/2/91~~3/1/94		
Unit or Activity	Bldg. No.	HWSAP Operator
52	9248	TSD Facility ~~& 90 day Consolidation Point~~

APPENDIX F

ANALYTICAL DATA

Analytical Data for Landfills 2, 5 and 6,
and EP Data for Sewage Plant Drying Bed
USAEHA, 1988a

Table B-1.

RUN DATE: 28 NOV 84

INSTALLATION: FT CARSON, CO

SITE: LANDFILL #2

PARAMETER	SAMPLING DATE	DETECTION LIMIT	UNITS	SAMPLING SITES RESULTS						
				LF2C	W2-4	W2-2	BBW1	DH2	W2-1	W2-3
ARSENIC	19 JUL 84	.005	MGL		ND	ND				
ARSENIC	20 JUL 84	.005	MGL				ND	ND		
BARIUM	19 JUL 84	.33	MGL		ND	ND				
BARIUM	20 JUL 84	.33	MGL				ND	ND		
CADMIUM	19 JUL 84	.500	MGL		ND	ND				
CADMIUM	20 JUL 84	.500	MGL				ND	ND		
CHROMIUM	19 JUL 84	.001	MGL		.049	.060				
CHROMIUM	20 JUL 84	.001	MGL				.024	.021		
FLUORIDE	19 JUL 84	.1	MGL		.5	.1				
FLUORIDE	20 JUL 84	.1	MGL	1.0			.9	1.1		
LEAD	19 JUL 84	.010	MGL		ND	.020				
LEAD	20 JUL 84	.010	MGL				.140	ND		
MERCURY	19 JUL 84	.2	UGL		ND	.2				
MERCURY	20 JUL 84	.2	UGL	ND			ND	ND		
NO2+NO3 AS N	19 JUL 84	.01	MGL		1.60	3.30				
NO2+NO3 AS N	20 JUL 84	.01	MGL				103.00	27.00		
SELENIUM	19 JUL 84	.005	MGL		ND	ND				
SELENIUM	20 JUL 84	.005	MGL				ND	ND		
SILVER	19 JUL 84	.001	MGL		.038	.050				
SILVER	20 JUL 84	.010	MGL				ND	ND		
CHLORIDE	19 JUL 84	.1	MGL		306.0#	1188.0#				
CHLORIDE	20 JUL 84	.1	MGL	1035.0#			174.0	83.0		
IRON	19 JUL 84	.02	MGL		.17	.22				
IRON	20 JUL 84	.10	MGL				ND	ND		
MANGANESE	19 JUL 84	.001	MGL		4.730#	6.060#				
MANGANESE	20 JUL 84	.030	MGL				.483#	ND		
SODIUM	19 JUL 84	1.	MGL		5176.	8188.				
SODIUM	20 JUL 84	1.	MGL				549.	326.		
SULFATE	19 JUL 84	.1	MGL		18625.0#	27000.0#				
SULFATE	20 JUL 84	.1	MGL	11000.0#			1500.0#	1587.0#		
PH(LAB)	19 JUL 84		PH		7.5	7.6				
PH(LAB)	20 JUL 84		PH	7.8			7.3	7.5		
SPEC COND	19 JUL 84	1.	UMC		24754.	35225.				
SPEC COND	20 JUL 84	1.	UMC	22504.			5574.	3599.		
COD	19 JUL 84	5.	MGL		25.	149.				
COD	20 JUL 84	25.	MGL				ND	25.		
AMMONIA-N	19 JUL 84	.20	MGL		1.20	ND				
AMMONIA-N	20 JUL 84	.20	MGL				ND	.59		
TOT KJEL N	19 JUL 84	.10	MGL		3.40	2.80				
TOT KJEL N	20 JUL 84	.20	MGL				ND			
COPPER	19 JUL 84	.025	MGL		.062	.105				

RUN DATE: 28 NOV 84

INSTALLATION: FT CARSON, CO

SITE: LANDFILL #2

PARAMETER	SAMPLING DATE	DETECTION LIMIT	UNITS	SAMPLING SITES RESULTS					
				LF2C	W2-4	W2-2	BBW1	DH2	W2-1	W2-3
COPPER	20 JUL 84	.025	MGL				ND	ND		
ZINC	19 JUL 84	.02	MGL		.02	.14				
ZINC	20 JUL 84	.02	MGL				ND	ND		
NICKEL	19 JUL 84	.01	MGL		.12	.12				
NICKEL	20 JUL 84	.10	MGL				ND	ND		
ANTIMONY	19 JUL 84	.005	MGL		ND	ND				
ANTIMONY	20 JUL 84	.005	MGL				ND	ND		
BERYLLIUM	19 JUL 84	.05	MGL		ND	ND				
BERYLLIUM	20 JUL 84	.05	MGL				ND	ND		
THALLIUM	19 JUL 84	.00	MGL		.00	ND				
THALLIUM	20 JUL 84	.00	MGL				ND	ND		

RUN DATE: 28 NOV 84

INSTALLATION: FT CARSON, CO SITE: LANDFILL #2

LEGEND
NOTES: ALL METALS AND OTHER PARAMETERS WHERE APPROPRIATE ARE ON A DISSOLVED (FILTERED) BASIS UNLESS OTHERWISE NOTED. DETECTION LIMITS SHOWN ARE NORMAL LEVELS; ACTUAL LIMITS MAY VARY IN ENVIRONMENTAL SAMPLES. ANALYTICAL RESULTS ARE ACCURATE TO EITHER 2 OR 3 SIGNIFICANT FIGURES.
B UPGRADIENT SITE
* VALUE EXCEEDS A NATIONAL INTERIM PRIMARY DRINKING WATER REGULATION STANDARD
# VALUE EXCEEDS A NATIONAL SECONDARY DRINKING WATER REGULATION CRITERIA

MGL - MILLIGRAMS/LITER
UGL - MICROGRAMS/LITER
PCL - PICOCURIES/LITER
UMC - MICROMHOS/CENTIMETER
NTU - NEPHELOMETRIC TURBIDITY UNITS
TON - THRESHOLD ODOR NUMBER
TDN - TASTE DILUTION INDEX NUMBER
CU - COLOR UNITS
PHM - PER 100 MILLILITERS

Table B-2. RUN DATE: 28 NOV 84

INSTALLATION: FT CARSON, CO

SITE: LANDFILL #5

PARAMETER	SAMPLING DATE	DETECTION LIMIT	UNITS	SAMPLING SITES RESULTS LF5A	LF5C	DH4	DH6
ARSENIC	21 JUL 84	.005	MGL	ND	ND	ND	ND
BARIUM	21 JUL 84	.33	MGL	ND	ND	ND	ND
CADMIUM	21 JUL 84	.500	MGL	ND	ND	ND	ND
CHROMIUM	21 JUL 84	.001	MGL	.028	.027	.022	.046
FLUORIDE	21 JUL 84	.1	MGL	1.0	.8	.9	.8
LEAD	21 JUL 84	.010	MGL	.010	.060	ND	.240
MERCURY	21 JUL 84	.2	UGL	ND	ND	ND	ND
NO2+NO3 AS N	21 JUL 84	.01	MGL	94.00	126.00	27.00	42
SELENIUM	21 JUL 84	.005	MGL	ND	ND	ND	ND
SILVER	21 JUL 84	.010	MGL	.020	.023	ND	.087
CHLORIDE	21 JUL 84	.1	MGL	80.0	120.0	89.0	280.0#
IRON	21 JUL 84	.10	MGL	ND	ND	ND	.45
MANGANESE	21 JUL 84	.001	MGL	.259#	.396#	.222#	1.090#
SODIUM	21 JUL 84	1.	MGL	1721.	2386.	884.	5076.
SULFATE	21 JUL 84	.1	MGL	5375.0#	6800.0#	2625.0#	16000.0#
PH(LAB)	21 JUL 84		PH	7.3	7.6	7.5	7.5
SPEC COND	21 JUL 84	1.	UMC	11242.	14039.	5960.	23540.
COD	21 JUL 84	25.	MGL	ND	ND	25.	25.
AMMONIA-N	21 JUL 84	.20	MGL	ND	ND	.36	.46
TOT KJEL N	21 JUL 84	.20	MGL	ND	ND	1.40	2.50
COPPER	21 JUL 84	.025	MGL	.037	.031	ND	.049
ZINC	21 JUL 84	.02	MGL	.02	ND	.06	ND
NICKEL	21 JUL 84	.10	MGL	.12	.11	ND	.11
ANTIMONY	21 JUL 84	.005	MGL	ND	ND	ND	ND
BERYLLIUM	21 JUL 84	.05	MGL	ND	ND	ND	ND
THALLIUM	21 JUL 84	.00	MGL	.00	ND	ND	ND

RUN DATE: 28 NOV 84

INSTALLATION: FT CARSON, CO

SITE: LANDFILL #5

LEGEND
NOTES: ALL METALS AND OTHER PARAMETERS WHERE APPROPRIATE ARE ON A DISSOLVED (FILTERED) BASIS UNLESS OTHERWISE NOTED. DETECTION LIMITS SHOWN ARE NORMAL LEVELS; ACTUAL LIMITS MAY VARY IN ENVIRONMENTAL SAMPLES. ANALYTICAL RESULTS ARE ACCURATE TO EITHER 2 OR 3 SIGNIFICANT FIGURES.
B UPGRADIENT SITE
• VALUE EXCEEDS A NATIONAL INTERIM PRIMARY DRINKING WATER REGULATION STANDARD
VALUE EXCEEDS A NATIONAL SECONDARY DRINKING WATER REGULATION CRITERIA

MGL - MILLIGRAMS/LITER
UGL - MICROGRAMS/LITER
PCL - PICOCURIES/LITER
UMC - MICROMHOS/CENTIMETER
NTU - NEPHELOMETRIC TURBIDITY UNITS
TON - THRESHOLD ODOR NUMBER
TDN - TASTE DILUTION INDEX NUMBER
CU - COLOR UNITS
PHM - PER 100 MILLILITERS

R_10

INSTALLATION: FT CARSON, CO

SITE: LANDFILL #6

PARAMETER	SAMPLING DATE	DETECTION LIMIT	UNITS	SAMPLING SITES RESULTS B W6-3	W6-1	W6-2
ARSENIC	19 JUL 84	.005	MGL			ND
ARSENIC	20 JUL 84	.005	MGL	ND	ND	
BARIUM	19 JUL 84	.33	MGL			ND
BARIUM	20 JUL 84	.33	MGL	ND	ND	
CADMIUM	19 JUL 84	.500	MGL			ND
CADMIUM	20 JUL 84	.500	MGL	ND	ND	
CHROMIUM	19 JUL 84	.001	MGL			.014
CHROMIUM	20 JUL 84	.001	MGL	.033	.012	
FLUORIDE	19 JUL 84	.1	MGL			1.6*
FLUORIDE	20 JUL 84	.1	MGL	.4	1.2	
LEAD	19 JUL 84	.010	MGL			ND
LEAD	20 JUL 84	.010	MGL	.190*	ND	
MERCURY	19 JUL 84	.2	UGL			ND
MERCURY	20 JUL 84	.2	UGL	ND	ND	
NO2+NO3 AS N	19 JUL 84	.01	MGL			6.20
NO2+NO3 AS N	20 JUL 84	.01	MGL	.66	5.30	
SELENIUM	19 JUL 84	.005	MGL			ND
SELENIUM	20 JUL 84	.005	MGL	ND	ND	
SILVER	19 JUL 84	.010	MGL			ND
SILVER	20 JUL 84	.010	MGL	.020	ND	
CHLORIDE	19 JUL 84	.1	MGL			27.0
CHLORIDE	20 JUL 84	.1	MGL	192.0	42.0	
IRON	19 JUL 84	.10	MGL			ND
IRON	20 JUL 84	.10	MGL	ND	ND	
MANGANESE	19 JUL 84	.001	MGL			.110#
MANGANESE	20 JUL 84	.030	MGL	1.530#	ND	
SODIUM	19 JUL 84	1.	MGL			221.
SODIUM	20 JUL 84	1.	MGL	2694.	1118.	
SULFATE	19 JUL 84	.1	MGL			475.0#
SULFATE	20 JUL 84	.1	MGL	7125.0#	305.0#	
PH(LAB)	19 JUL 84		PH			7.5
PH(LAB)	20 JUL 84		PH	7.4	7.8	
SPEC COND	19 JUL 84	1.	UMC			1677.
SPEC COND	20 JUL 84	1.	UMC	13253.	1439.	
COD	19 JUL 84	25.	MGL			ND
COD	20 JUL 84	25.	MGL	ND	ND	
AMMONIA-N	19 JUL 84	.20	MGL			ND
AMMONIA-N	20 JUL 84	.20	MGL	. .47	ND	
TOT KJEL N	19 JUL 84	.10	MGL			.30
TOT KJEL N	20 JUL 84	.10	MGL	15.00	.36	
COPPER	19 JUL 84	.025	MGL			ND

RUN DATE: 28 NOV 84

INSTALLATION: FT CARSON, CO

SITE: LANDFILL #6

PARAMETER	SAMPLING DATE	DETECTION LIMIT	UNITS	SAMPLING SITES RESULTS B W6-3	W6-1	W6-2
COPPER	20 JUL 84	.025	MGL	.035	ND	
ZINC	19 JUL 84	.02	MGL			ND
ZINC	20 JUL 84	.02	MGL	.02	.13	
NICKEL	19 JUL 84	.10	MGL			ND
NICKEL	20 JUL 84	.10	MGL	ND	ND	
ANTIMONY	19 JUL 84	.005	MGL			ND
ANTIMONY	20 JUL 84	.005	MGL	ND	ND	
BERYLLIUM	19 JUL 84	.05	MGL			ND
BERYLLIUM	20 JUL 84	.05	MGL	ND	ND	
THALLIUM	19 JUL 84	.00	MGL			.00
THALLIUM	20 JUL 84	.00	MGL	.00	ND	

RUN DATE: 28 NOV 84

INSTALLATION: FT CARSON, CO SITE: LANDFILL #6

LEGEND
NOTES: ALL METALS AND OTHER PARAMETERS WHERE APPROPRIATE ARE ON A DISSOLVED (FILTERED) BASIS UNLESS OTHERWISE NOTED. DETECTION LIMITS SHOWN ARE NORMAL LEVELS; ACTUAL LIMITS MAY VARY IN ENVIRONMENTAL SAMPLES. ANALYTICAL RESULTS ARE ACCURATE TO EITHER 2 OR 3 SIGNIFICANT FIGURES.
B UPGRADIENT SITE
* VALUE EXCEEDS A NATIONAL INTERIM PRIMARY DRINKING WATER REGULATION STANDARD
# VALUE EXCEEDS A NATIONAL SECONDARY DRINKING WATER REGULATION CRITERIA

MGL - MILLIGRAMS/LITER
UGL - MICROGRAMS/LITER
PCL - PICOCURIES/LITER
UMC - MICROMHOS/CENTIMETER
NTU - NEPHELOMETRIC TURBIDITY UNITS
TON - THRESHOLD ODOR NUMBER
TDN - TASTE DILUTION INDEX NUMBER
CU - COLOR UNITS
PHM - PER 100 MILLILITERS

Reference No. 870302
June 22, 1987

Table B-5h. CONTAMINANTS IN EXTRACTION PROCEDURE EXTRACT (SEWAGE PLANT DRYING BED)

Contaminant	Found (mg/l)	Max. Allowed (mg/l)
Arsenic	0.0144	5.0
Barium	0.45	100
Cadmium	0.0077	1.0
Chromium	0.010	5.0
Lead	0.12	5.0
Mercury	0.003	0.2
Selenium	0.026	1.0
Silver	0.012	5.0

Reference No. 870302
June 22, 1987

Table B-5g. TOTAL METALS - SEWAGE PLANT DRYING BED

Parameter	Found (ppm)
Arsenic	0.283
Barium	130
Cadmium	14.6
Chromium	39.9
Lead	85.4
Mercury	0.161
Selenium	40.6
Silver	2.82

Analytical Data for Landfills 2, 4, 5, 6, and 11
USAEHA, 1988b

CHEMICAL ANALYSIS RESULTS
Ground-Water Samples
Landfills #2 and #5
Samples Collected 24 June - 2 July 1988
(All results in mg/L unless otherwise noted)

Parameter	W2-4	LF2C	W2-15	W2-2	W2-11A	W2-11B	W2-16	W2-5	W2-6	W2-7	W2-8A	W2-8B
TOTAL DISSOLVED METALS												
arsenic	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
barium	<0.06	<0.06	<0.06	<0.06	<0.06	0.18	<0.06	<0.06	<0.06	0.10	0.12	<0.06
cadmium	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0006	<0.0005	<0.0005
chromium	0.002	0.005	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
lead	<0.001	<0.001	<0.001	0.003	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.005	<0.001
mercury	<0.0002	<0.0002	<0.0002	<0.0002	<0.0007	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
selenium	0.02	0.01	<0.01	0.06	<0.01	0.04	0.09	0.19	0.02	0.10	0.02	0.02
silver	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
beryllium	<0.005	<0.005	<0.005	0.008	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
copper	<0.01	0.02	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
nickel	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
antimony	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
thallium	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
zinc	0.03	0.06	0.05	0.05	0.02	0.05	0.01	0.01	0.01	0.03	0.02	<0.01
INORGANIC NON-METALS												
field pH	7.0	7.4	7.0	7.3	7.5	7.3	7.4	7.1	7.1	7.0	7.1	7.7
laboratory pH	7.6	7.1	7.4	7.4	7.8	7.6	7.7	7.5	7.6	7.4	7.5	7.8
specific conductance	17000.	16000.	18000.	34000.	18000.	18000.	19000.	19000.	19000.	11000.	17000.	16000.
total dissolved solids	19000.	14000.	20000.	41000.	20000.	11000.	21000.	20000.	18000.	9900.	18000.	16000.
chemical oxygen demand	98.	290.	150.	320.	150.	150.	120.	280.	440.	150.	120.	120.
sulfate	13000.	8300.	12000.	29000.	12000.	13000.	14000.	12000.	11000.	5400.	11000.	9800.
nitrate + nitrite as N	8.2	<0.05	<0.05	51.	30.	33.	15.	350.	92.	61.	110.	74.
VOLATILE ORGANIC COMPOUNDS												
2-butanone	<0.010	0.064	<0.010	0.016	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
SEMIVOLATILE ORGANIC COMPOUNDS, PESTICIDES/PCBs, HERBICIDES (W2-2, W2-4, W2-15, LF2C, and LF2-L1 only)												
bis(2-ethylhexyl)phthalate	<0.020	<0.020	0.030	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020

NOTE: No organic compounds other than those listed were detected in samples. No compounds were detected in volatile organic compound analysis travel blanks.

CHEMICAL ANALYSIS RESULTS
Ground-Water, Surface Water, and Leachate Samples
Landfills #2 and #5
Samples Collected 24 June - 2 July 1988
(All results in mg/L unless otherwise noted)

Parameter	W2-9	W2-10	W2-12	BBW1	LF2-L1	W5-1	BDU	BDD
TOTAL DISSOLVED METALS								
arsenic	<0.005	<0.005	<0.005	<0.005	0.003	<0.005	<0.001	<0.001
barium	<0.06	<0.06	0.16	0.13	<0.03	<0.06	<0.03	<0.03
cadmium	<0.0005	0.0008	<0.0005	<0.0005	0.0009	<0.0005	<0.0005	<0.0005
chromium	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	0.001	0.001
lead	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
mercury	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
selenium	0.02	0.12	<0.01	0.04	0.03	0.01	0.08	0.09
silver	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
beryllium	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
copper	<0.01	<0.01	<0.01	0.02	0.01	<0.01	0.01	0.01
nickel	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
antimony	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
thallium	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	0.1	0.1
zinc	0.01	0.03	0.05	0.05	<0.01	0.03	0.01	<0.01
INORGANIC NON-METALS								
field pH	7.1	7.0	6.9	7.4		7.2		
laboratory pH	7.5	7.6	7.4	7.3	8.3	7.7	8.5	8.2
specific conductance	18000.	14000.	9800.	6200.	14000.	9600.	7600.	6600.
total dissolved solids	19000.	15000.	9000.	5100.	14000.	9500.	7200.	6200.
chemical oxygen demand	140.	160.	140.	73.	100.	120.	42.	38.
sulfate	12000.	8500.	5100.	3200.	9000.	6100.	4100.	3500.
nitrate + nitrite as N	110.	90.	3.4	44.	<0.05	18.	85.	50.
VOLATILE ORGANIC COMPOUNDS								
2-butanone	<0.010	<0.010	0.027	<0.010	<0.010	<0.010	<0.010	<0.010
acetone	<0.010	<0.010	0.053	<0.010	<0.010	<0.010	<0.010	<0.010
benzene	<0.005	<0.005	<0.005	0.006	<0.005	<0.005	<0.005	<0.005
methyl t-butyl ether	<0.005	<0.005	<0.005	0.009	<0.005	<0.005	<0.005	<0.005
SEMIVOLATILE ORGANIC COMPOUNDS, PESTICIDES/PCBs, HERBICIDES (W5-1 and BDD only)								
bis(2-ethylhexyl)phthalate	<0.020	<0.020	<0.020	<0.020	0.020	0.090	<0.020	<0.020

NOTE: No organic compounds other than those listed were detected in samples. No compounds were detected in volatile organic compound analysis travel blanks.

CHEMICAL ANALYSIS RESULTS
Ground-Water Samples
Landfill #2
Samples Collected 11-27 November 1988
(All results in mg/L unless otherwise noted)

Parameter	W2-15	W2-12	W2-17	W2-19	BBW1
TOTAL DISSOLVED METALS (W2-17 and W2-19 only)					
arsenic			<0.001	<0.001	
barium			106.	108.	
cadmium			<0.0026	0.0008	
chromium			0.120	0.275	
lead			<0.001	<0.001	
mercury			<0.0002	<0.0002	
selenium			0.050	<0.001	
silver			<0.020	<0.020	
INORGANIC NON-METALS					
specific conductance			17000.	35000.	
total dissolved solids			19000.	43000.	
sulfate			13000.	33000.	
nitrate + nitrite as N	<0.05	120.	39.	<0.05	
VOLATILE ORGANIC COMPOUNDS					
benzene	<0.005	<0.005	<0.005	<0.005	0.079
methyl t-butyl ether	<0.005	<0.005	<0.005	<0.005	0.270
C4H8 isomer	<0.005	<0.005	<0.005	<0.005	0.007

NOTES: No other volatile organic compounds were detected. The volatile organic compound analysis travel blank contained no detectable compounds.

CHEMICAL ANALYSIS RESULTS
Ground-Water Samples
Landfills #4, #5, #6, and #11
Samples Collected 11-22 November 1988
(All results in mg/L unless otherwise noted)

Parameter	W4-1	W4-2	W4-3	W11-1	W11-2	W11-3	W5-2	W6-5
TOTAL DISSOLVED METALS								
arsenic	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001
barium	0.104	0.127	0.077	0.092	0.081	0.073	0.092	0.120
cadmium	<0.0005	<0.0005	0.0010	<0.0005	<0.0005	<0.0005	0.0023	<0.0005
chromium	0.045	0.065	0.034	<0.020	<0.020	<0.020	0.111	0.030
lead	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.066	0.068
mercury	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
selenium	<0.001	0.023	0.023	0.020	0.033	0.034	0.007	<0.001
silver	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
INORGANIC NON-METALS								
specific conductance	8000.	19000.	12000.	2700.	6000.	7100.	18000.	7800.
total dissolved solids	3700.	19000.	11000.	2100.	5800.	6900.	19000.	7500.
sulfate	4200.	12000.	7400.	1200.	3200.	4200.	10000.	4900.
nitrate + nitrite as N	<0.05	<0.05	3.4	150.	32.	39.	490.	<0.05
VOLATILE ORGANIC COMPOUNDS								
acetone	<0.010	<0.010	<0.010	0.010	0.020	0.020	<0.010	<0.010
SEMIVOLATILE ORGANIC COMPOUNDS, PESTICIDES/PCBs, HERBICIDES (W4-1, W4-2, W4-3, W6-5, and W11-3 only)								
bis(2-ethylhexyl)phthalate	<0.020	0.030	0.040			0.030		<0.020

NOTES: No other organic compounds were detected in the samples. There were no compounds detected in volatile organic compound analysis travel blanks.

Analytical Data for Landfills 1, 2, 4, 5, 6 and 11; Butts Army Airfield; and Range 1
USAEHA, 1992

TABLE C-1. GROUND-WATER SAMPLES FROM LANDFILLS #1 AND #4 WITH QA SAMPLES

PARAMETER	SAMPLING SITES: Landfill #1		Landfill #4 (duplicate)				QA Blanks		
Well No.	1-1	1-3	W4-1	W4-1D	W4-2	W4-3	OB	TRIP BLANKS	MD
NON-METALS									
NO_3/NO_2 as mg/L-N	NA	< 0.05	< 0.05	< 0.05	< 0.05	0.31	NA	NA	NA
NH_3 as mg/L-N	NA	1.0	0.80	0.52	1.3	0.44	NA	NA	NA
Sulfate - mg/L	590††	14000††	4000††	4100††	10000††	6800††	NA	NA	NA
Chloride - mg/L	42	610††	180	180	480††	250††	NA	NA	NA
Chemical Oxygen Dem. mg/L	NA	130	48	42	42	40	NA	NA	NA
TDS - mg/L	NA	NA	7500†	7500†	16000†	12000†	NA	NA	NA
Conductivity - µmhos/cm	2500	18000	7600	7500	16000	12000	NA	NA	NA
T-Alkalinity - mg/L $CaCO_3$	NA	NA	440	440	380	250	NA	NA	NA
pH	6.8	NA	7.5	7.6	7.6	7.7	NA	NA	NA
FIELD									
pH	6.8	7.3	7.0	7.0	6.6	6.5	NA	NA	NA
Temperature °C	16	16	12	12	12	17	NA	NA	NA
Conductivity - µmhos/cm	1950	16000	5100	5100	13000	10000	NA	NA	NA
DISSOLVED METALS (mg/L)									
Antimony	NA	NA	< 0.001	< 0.001	< 0.001	< 0.001	NA	NA	0.028
Arsenic	NA	NA	< 0.001	< 0.001	< 0.001	< 0.001	NA	NA	< 0.001
Barium	NA	NA	0.106	0.043	0.106	0.108	NA	NA	< 0.010
Beryllium	NA	NA	0.002	0.003	0.004	0.005	NA	NA	0.002
Calcium	NA	NA	407	390	164	362	NA	NA	< 0.050
Cadmium	NA	NA	< .0005	0.0007	0.0005	0.0010	NA	NA	< 0.0002
Chromium	NA	NA	3.75††	0.082†	0.102††	0.127††	NA	NA	1.08††
Iron	NA	NA	7.42†	0.146	0.111	0.082	NA	NA	4.54††
Lead	NA	NA	< 0.001	< 0.001	< 0.001	< 0.001	NA	NA	0.0025
Mercury	NA	NA	0.0003	0.0003	0.0002	0.0002	NA	NA	< 0.0002
Magnesium	NA	NA	364	361	446	295	NA	NA	< 0.250
Nickel	NA	NA	2.41	0.150	0.215	0.225	NA	NA	0.287
Potassium	NA	NA	2.83	3.32	14.3	14.6	NA	NA	1.38
Selenium	NA	NA	< 0.001	< 0.001	< 0.001	< 0.001	NA	NA	< 0.005
Silver	NA	NA	0.100†	0.110††	0.148††	0.302††	NA	NA	0.092†
Sodium	NA	NA	1230	1280	3820	2630	NA	NA	1.38
Thallium	NA	NA	< 0.001	< 0.001	< 0.001	< 0.001	NA	NA	< 0.001
Zinc	NA	NA	0.529	0.492	0.618	0.324	NA	NA	0.018
VOLATILES (µg/L)							NA		NA
Benzene	3.†								
Ethylbenzene	1.								
Toluene	11.					0.2			
o-Xylene	2.								
M&P-Xylene	2.								
Dichlorodifluoromethane	27.								
1,1-Dichloroethane	140.	0.9							
1,2-Dichloroethane	3.†								
c-1,2-Dichloroethene	83.††								
t-1,2-Dichloroethene	38.								
1,2-Dichloropropane	17.††								
Methylene Chloride *	33.		0.7	0.6	0.5	2.		0.4	
Tetrachloroethene	66.††								
Trichloroethene	140.††								
Styrene						0.4			
SEMI-VOLATILES (µg/L)								NA	NA
Bis(2-ethylhexyl) phthalate *	19.	23.	1.	85.	10.	17.	88.		
Phenol *	60.						21.		
2-methylphenol	6.								
Diethylphthalate *	7.						5.		
2-Chlorophenol							4.		
PESTICIDES & PCBs (µg/L)	NA	ND	NA	NA	ND	NA	NA	NA	NA

NOTES: Table only lists organic compounds detected in the sample; OD & MD are organic and metal equipment rinse blanks
NA=Not Analyzed for the parameter; ND=Nothing Detected; * Detected in Blank; † Above the Federal NPDWR MCL/SMCL;
† Above Colorado Human Health Standards or Colorado Ground Water Organic Chemical Standards

TABLE C-2. GROUND-WATER SAMPLES FROM LANDFILLS #2 AND #5

PARAMETER	SAMPLING SITES Landfill #2								
Well No.	61	62	63	64	65	66	67	68	69
NON-METALS									
NO_3/NO_2 as mg/L-N	140††	120††	100††	10	120††	61††	70††	180††	29††
NH_3 as mg/L-N	0.29	0.29	0.30	2.4	0.41	0.34	0.27	0.29	0.38
Sulfate - mg/L	8000††	11000††	12000††	6800††	11000††	6600††	11000††	9100††	18000††
Chloride - mg/L	320††	340††	310††	350††	270††	360††	700††	720††	190††
Chemical Oxygen Dem. mg/L	40	37	34	65	80	51	51	48	110
TDS - mg/L	14000	17000†	19000†	NA	18000†	11000†	18000†	16000†	NA
Conductivity - µmhos	13000	17000	17000	NA	16000	12000	17000	16000	22000
T-Alkalinity mg/L $CaCO_3$	440	520	500	NA	490	670	870	400	NA
pH	7.6	7.6	7.2	NA	7.5	8.1	7.4	7.4	7.1
FIELD									
pH	6.7	7.0	7.1	NA	NA	NA	7.1	NA	7.2
Temperature °C	14	13.2	13	14	12	13	14.5	13	12
Conductivity - µmhos/cm	10500	13000	14000	9900	13200	9500	15000	13000	18000
DISSOLVED METALS (mg/L)									
Antimony	< 0.01	< 0.01	< 0.01	NA	< 0.01	< 0.01	< 0.01	< 0.01	NA
Arsenic	0.001	0.001	0.001	NA	0.0088	0.001	0.001	< 0.001	NA
Barium	0.069	0.091	0.130	NA	0.147	0.116	0.046	0.029	NA
Beryllium	< 0.001	0.001	0.003	NA	0.001	< 0.001	0.003	0.003	NA
Calcium	440	430	420	NA	180	450	410	400	NA
Cadmium	0.0018	0.0012	0.0011	NA	0.0008	0.0011	0.0010	0.0014	NA
Chromium	0.400††	0.343††	0.810††	NA	0.164††	0.132††	0.461††	0.524††	NA
Iron	0.705††	1.02††	2.82††	NA	0.211	0.178	1.87††	2.06††	NA
Lead	0.0029	0.0018	< 0.001	NA	0.0014	< 0.001	< 0.001	< 0.001	NA
Mercury	0.0004	0.0004	0.0004	NA	0.0004	0.0004	0.0003	0.0003	NA
Magnesium	600	790	880	NA	830	310	440	370	NA
Nickel	0.318	0.300	0.685	NA	0.309	0.242	0.240	0.275	NA
Potassium	10.8	14.3	8.24	NA	9.17	16.5	16.7	20.4	NA
Selenium	0.015†	< 0.005	0.009	NA	0.017†	< 0.005	< 0.005	0.015†	NA
Silver	0.022	0.025	0.102††	NA	0.050†	0.038	0.106††	0.108††	NA
Sodium	2600	3500	3700	NA	3800	2300	3900	3700	NA
Thallium	< 0.001	< 0.001	< 0.001	NA	< 0.001	< 0.001	< 0.001	< 0.001	NA
Zinc	0.164	0.083	1.14	NA	0.086	0.068	0.312	0.285	NA
VOLATILES (µg/L)		ND	ND		ND	ND	ND	ND	
Methylene Chloride*	.8			0.8					.6
SEMI-VOLATILES (µg/L)			ND	NA	ND				NA
Bis(2-ethylhexyl) phthalate *	6.	35.				56.	5.		
Phenol *								27.	
PESTICIDES & PCBs (µg/L)	NA	NA	ND	NA	NA	NA	NA	NA	NA

NOTES: Table only lists organic compounds detected in the sample; CD & MD are organic and metal equipment rinse blanks
NA=Not Analyzed for the parameter; ND=Nothing Detected; * Detected in Blank; † Above the Federal NPDWR MCL/SMCL;
†† Above Colorado Human Health Standards or Colorado Ground Water Organic Chemical Standards

TABLE C-2. GROUND-WATER SAMPLES FROM LANDFILLS #2 AND #5 (CONTINUED)

PARAMETER	SAMPLING SITES								
	Landfill #2	(duplicate)					(duplicate)		
Well No.	70	70-D	71	72	73	74	74-D	75	76
NON-METALS									
NO_3/NO_2 as mg/L-N	< 0.05	0.05	5.9	72††	49††	85††	87††	< 0.05	< 0.05
NH_3 as mg/L-N	0.79	0.77	0.29	0.38	0.25	0.54	0.47	0.71	0.88
Sulfate - mg/L	31000††	30000††	12000††	22000††	12000††	28000††	29000††	7500††	11000††
Chloride - mg/L	260††	260††	200	580††	260††	690††	650††	420††	200
Chemical Oxygen Dem. mg/L	140	140	87	330	76	230	220	220	76
TDS - mg/L	47000†	47000†	20000†	35000†	20000†	45000†	46000†	NA	19000†
Conductivity - µmhos	31000	31000	17000	25000	17000	32000	32000	14000	17000
T-Alkalinity mg/L $CaCO_3$	330	330	480	1200	380	1500	1500	NA	3100
pH	7.6	7.6	7.8	7.3	7.9	7.6	7.5	7.0	7.6
FIELD									
pH	6.9	6.9	7.3	6.9	7.3	6.7	6.7	7.1	7.0
Temperature °C	12	12	11.5	12	12	13	13	13.1	12
Conductivity - µmhos/cm	27000	27000	13000	21000	13000	27000	27000	13800	15700
DISSOLVED METALS (mg/L)									
Antimony	< 0.01	< 0.01	0.019	< 0.01	< 0.01	< 0.01	< 0.01	0.029	0.013
Arsenic	< 0.001	< 0.001	0.001	< 0.001	0.001	< 0.001	< 0.001	0.0031	< 0.001
Barium	0.036	0.042	0.048	0.081	< 0.010	< 0.01	< 0.010	< 0.010	0.017
Beryllium	0.004	0.003	0.004	0.003	0.003	0.003	0.003	0.001	0.002
Calcium	140	140	360	120	330	200	310	390	410
Cadmium	< 0.0005	< 0.0005	< 0.0005	0.0010	0.0006	0.0005	0.0006	0.0015	0.0006
Chromium	0.335††	0.413††	0.845††	5041††	0.235††	0.430††	0.553††	0.143††	0.723††
Iron	1.54††	1.75††	3.32††	33.7††	1.17††	1.91††	2.45††	0.943††	3.09††
Lead	< 0.001	< 0.001	0.0013	< 0.001	0.0047	< 0.001	< 0.001	0.0206†	0.0014
Mercury	0.0003	0.0003	0.0003	0.0002	0.0004	0.0001	0.0001	0.0003	0.0002
Magnesium	2500	2700	1000	1900	870	2100	2000	610	1100
Nickel	0.273	0.332	0.376	3.68	0.092	0.178	0.524	0.298	0.386
Potassium	31.9	31.8	6.15	26.5	2.69	37.6	38.9	5.21	11.5
Selenium	< 0.005	< 0.005	0.022†	< 0.005	0.012†	0.106††	0.106††	< 0.005	< 0.005
Silver	0.131††	0.130††	0.144††	0.058†	0.076†	0.080†	0.099†	0.069†	0.075†
Sodium	8000	9300	3900	6900	3700	10000	9200	3200	3800
Thallium	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Zinc	1.85	1.86	0.797	1.31	0.813	1.50	1.64	0.513	0.979
VOLATILES (µg/L)	ND	ND			ND	ND	ND		
Methylene Chloride*			.8	.7					
Dichlorodifluoromethane								0.6	
Benzene								0.7	0.5
1,2-dichloroethane									2.†
c-1,2-dichloroethene									1.
1,2-dichloropropane									2.†
SEMI-VOLATILES (µg/L)	ND	ND	ND	ND	ND				
Bis(2-ethylhexyl) phthalate *						520.	51.		12.
Phenol *								3.	
PESTICIDES & PCBs (µg/L)	NA	NA	NA	NA	NA	ND	ND	ND	ND

NOTES: Table only lists organic compounds detected in the sample; CD & MD are organic and metal equipment rinse blanks
NA=Not Analyzed for the parameter; ND=Nothing Detected; * Detected in Blank; † Above the Federal NPDWR MCL/SMCL;
† Above Colorado Human Health Standards or Colorado Ground Water Organic Chemical Standards

TABLE C-2. GROUND-WATER SAMPLES FROM LANDFILLS #2 AND #5 (CONTINUED)

PARAMETER	SAMPLING SITES Landfill #2			Landfill #5				
Well No.	78	81	BBW1	82	84	85	85-D (duplicate)	W5-2
NON-METALS								
NO_3/NO_2 as mg/L-N	NA	0.31	43††	17††	120††	170††	170††	330††
NH_3 as mg/L-N	NA	0.73	0.23	0.37	0.32	0.25	0.31	0.23
Sulfate - mg/L	NA	17000††	3400††	5400††	6400††	8000††	7800††	10000††
Chloride - mg/L	NA	100	120	88	97	97	96	540††
Chemical Oxygen Dem. mg/L	NA	84	120	34	34	45	26	82
TDS - mg/L	NA	25000†	7200†	9200†	11000†	14000†	14000†	19000†
Conductivity - µmhos/cm	NA	19000	7300	9100	9800	12000	12000	17000
T-Alkalinity mg/L $CaCO_3$	NA	900	570	250	290	700	690	860
pH	NA	7.7	7.1	7.6	7.8	7.6	7.3	8.0
FIELD								
pH	NA	7.2	6.8	7.1	7.3	7.0	7.0	7.0
Temperature °C	17	14.5	14	13	14.2	13.8	13.8	14
Conductivity - µmhos/cm	10500	17000	5100	6500	8000	9200	9200	15000
DISSOLVED METALS (mg/L)								
Antimony	NA	0.022	< 0.01	< 0.001	< 0.001	< 0.01	< 0.01	< 0.01
Arsenic	NA	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Barium	NA	0.070	0.131	0.159	0.193	0.113	0.119	0.136
Beryllium	NA	0.002	0.003	0.007	0.009	0.003	0.002	0.001
Calcium	NA	250	410	258	409	460	410	370
Cadmium	NA	< 0.0005	0.0007	< 0.0005	0.0011	0.0011	0.0012	0.0011
Chromium	NA	0.079†	0.605††	0.185††	0.232††	0.544††	0.910††	0.162††
Iron	NA	0.189	2.00††	0.155	0.403††	2.48††	2.38††	0.349††
Lead	NA	< 0.001	0.0028	< 0.001	0.001	0.0037	0.0070	0.0015
Mercury	NA	0.0003	0.0004	0.0003	0.0004	0.0004	0.0004	0.0004
Magnesium	NA	1300	300	< 0.250	977	1000	970	1800
Nickel	NA	0.177	0.932	0.467	0.586	0.878	0.694	0.329
Potassium	NA	13.9	4.57	10.2	10.4	13.7	8.66	29.3
Selenium	NA	0.019†	0.030†	0.0076	0.0793††	0.203††	0.237††	0.022†
Silver	NA	0.085†	0.112††	0.396††	0.436††	0.153††	0.151††	0.060†
Sodium	NA	4300	100	2110	2180	2000	1900	3700
Thallium	NA	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Zinc	NA	1.12	0.799	0.160	0.172	1.34	1.29	0.690
VOLATILES (µg/L)		ND				ND		ND
Methylene Chloride*	4.		.3	.3	.3			
1,4-dichlorobenzene	1.							
Dichlorodifluoromethane	9.							
1,1-dichloroethane	.8						.2	
1,2-dichloroethane	.8							
c-1,2-dichloroethene	2.			.6	1.			
t-1,2-dichloroethene	.8							
Naphthalene	.8							
Tetrachloroethene	1.							
Toluene	.8							
Trichloroethene	.9			5.	2.			
1,2,4-trimethylbenzene	1.							
Trichlorofluoromethane	4.							
SEMI-VOLATILES (µg/L)	NA		ND					
Bis(2-ethylhexyl) phthalate*		2900		3.	6.	13.	6.	13.
PESTICIDES & PCBs (µg/L)	NA	ND	NA	ND	NA	ND	ND	NA

NOTES: Table only lists organic compounds detected in the sample; OD & MD are organic and metal equipment rinse blanks
NA=Not Analyzed for the parameter; ND=Nothing Detected; * Detected in Blank; † Above the Federal NPDWR MCL/SMCL;
† Above Colorado Human Health Standards or Colorado Ground Water Organic Chemical Standards

TABLE C-3. GROUND-WATER SAMPLES FROM LANDFILLS #6 AND #11

PARAMETER	SAMPLING SITES								
	Landfill #6		Landfill #11						
				(duplicate)					(duplicate)
Well No.	W6-3	W6-5	LF6A	LF6A-D	W11-1	W11-2	W11-3	DH2	DH2-D
NON-METALS									
NO_3/NO_2 as mg/L-N	< 0.05	< 0.05	5.4	5.2	18.0	33††	22††	39††	40††
NH_3 as mg/L-N	1.4	0.71	0.25	0.32	0.24	0.20	0.21	0.50	0.45
Sulfate - mg/L	8500††	6800††	390††	390††	2500††	4500††	4600††	3000††	2900††
Chloride - mg/L	130	200	29	28	60	330††	68	92	91
Chemical Oxygen Dem. mg/L	28	54	<25	<25	26	<25	<25	<25	<25
Total Dissolved Solids	13000†	11000†	940†	810†	4200†	7400†	7600†	5200†	5200†
Conductivity - µmhos/cm	11000	11000	1300	1300	4500	7200	7300	5200	5300
T-Alkalinity mg/L $CaCO_3$	680	660	240	240	310	410	460	420	420
pH	7.7	7.5	7.1	7.2	7.2	7.7	7.6	7.0	7.0
FIELD									
pH	7.4	7.2	6.6	6.6	6.7	NA	6.8	6.9	6.9
Temperature °C	16	14	13	13	13	13	14	11	11
Conductivity - µmhos/cm	10090	9500	980	980	3400	3500	3800	4500	4500
DISSOLVED METALS (mg/L)									
Antimony	< 0.001	< 0.001	< 0.001	< 0.001	< 0.01	< 0.01	0.01	< 0.01	< 0.01
Arsenic	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Barium	0.139	0.143	0.143	0.134	0.115	0.123	0.123	0.123	0.131
Beryllium	0.006	0.006	0.006	0.006	0.002	0.002	0.001	0.002	0.001
Calcium	371	258	119	116	380	580	480	590	570
Cadmium	0.0011	< 0.0005	0.0010	< 0.0005	0.0011	0.0011	0.0011	< 0.0005	< 0.0005
Chromium	0.136††	0.158††	0.149††	0.325††	0.588††	0.814††	1.5††	0.125††	0.397††
Iron	0.111	0.396††	1.40††	6.04††	1.98††	2.59††	4.64††	0.254	1.27††
Lead	< 0.001	< 0.001	0.0075	0.0026	0.0028	0.0023	0.0086	0.0014	0.0018
Mercury	0.0003	0.0003	0.0003	0.0004	0.0004	0.0004	0.0003	0.0004	0.0004
Magnesium	483	261	54	50.2	190	400	470	250	240
Nickel	0.333	0.401	0.385	0.463	0.498	0.640	1.20	0.348	0.432
Potassium	15.3	13.2	3.28	2.90	7.58	6.98	9.57	3.08	3.70
Selenium	< 0.001	< 0.001	0.0018	0.0034	0.041†	0.051††	0.057††	0.033†	0.022†
Silver	0.286††	0.344††	0.327††	0.314††	0.115††	0.082†	0.057†	0.120††	0.035
Sodium	2080	1980	86.5	95	520	980	1100	620	540
Thallium	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.001	< 0.001	< 0.001	< 0.001
Zinc	0.233	0.158	0.091	0.080	0.330	0.504	0.795	0.406	0.440
VOLATILES (µg/L)									
Methylene Chloride*	0.4	0.3	0.3	0.3	0.4	0.3	0.5	0.3	
Chloroform			0.4	0.4					
Tetrachloroethene			16.††	17.††					
1,1,1-trichloroethane					4.		0.4	0.6	0.8
Trichloroethene			1.						
SEMI-VOLATILES (µg/L)									
Bis(2-ethylhexyl) phthalate *	16.	470.	110.	240.	180.	23.	130.	2.	3.
Phenol *	28.			8.	21.	210.			
2-nitrophenol						10.			
Di-n-butylphthalate				7.					
PESTICIDES & PCBs (µg/L)	ND	NA	ND	ND	NA	NA	NA	NA	NA

NOTES: Table only lists organic compounds detected in the sample; OD & MD are organic and metal equipment rinse blanks
NA=Not Analyzed for the parameter; ND=Nothing Detected; * Detected in Blank; † Above the Federal NPDWR MCL/SMCL;
† Above Colorado Human Health Standards or Colorado Ground Water Organic Chemical Standards

TABLE C-4. ANALYTICAL RESULTS OF GROUND-WATER SAMPLES FROM BUTTS ARMY AIRFIELD MONITORING WELLS

PARAMETER	MONITORING WELL IDENTIFICATION										
	BAA-1	BAA-2	BAA-3	BAA-4	BAA-5	BAA-6	BAA-7	BAA-7D	BAA-8	A	F
Total Petroleum Hydrocarbon (mg/L)	2.0	40.2	3.7	2.0	1.5	< 1.0	< 1.0	< 1.0	< 1.0	NA	NA
Metals (mg/L)											
Lead	NA	0.0016	NA	0.0019	< 0.001	0.0014	0.0031	NA	0.0013	NA	NA
Volatiles (µg/L)											
Methyl-t-butyl ether	< 5.	< 1,000.	< 50.	< 5.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 400
Benzene	150.*	9,900.*	2,100.*	200.*	4.†	1.†	< 1.	1.†	6.*	4.†	2,800.*
Ethylbenzene	5.	2,300.*	29.	20.	< 2.	< 1.	< 1.	< 1.	< 1.	1.	1,500.*
Toluene	46.	15,000.*	230.	200.	2.	< 1.	< 1.	1.	1.	5.	6,500.*
O-Xylene	91.	3,200.‡	390.	39.	2.	< 1.	< 1.	< 1.	1.	2.	1,900.
M&P-Xylene	51.	9,800.‡	1,700.	270.	1.	< 1.	< 1.	1.	< 1.	4.	8,000.
Field Measurements											
pH	6.7	6.8	6.3	7.0	6.6	6.7	6.7	6.7	--	--	6.8
Conductivity (µmhos/cm)	1420	1410	1250	1100	1250	1020	1000	1000	1210	--	1600
Temperature °C	14.1	14.2	13	13	14	15	14	14	--	--	13
1988 USAEHA RESULTS (µg/L)											
Benzene	8,900	14,000	13,000	6,100	540	410	< 3		1,500		
Toluene	12,100	20,000	16,000	9,300	5	13	5		260		
Ethylbenzene	1,200	1,700	2,300	970	20	< 3	< 3		5		

NOTES: BAA-7D is duplicate sample of BAA-7
* Exceeds both Federal NPDWR MCL and Colorado Ground Water Organic Chemical Standards
† Exceeds Colorado Ground Water Organic Chemical Standards
‡ Exceeds Federal NPDWR MCL for total Xylenes

TABLE C-5. RESULTS FOR EXPLOSIVE WATER ANALYSIS OF RANGE #1 GROUND WATER

EXPLOSIVE COMPOUND	MONITORING WELL				
	OB-1	OB-1D	OB-2	OB-3	OB-4
2,6-dinitrotoluene	<0.007	<0.007	<0.007	<0.007	<0.007
2,4-dinitrotoluene	<0.1	<0.1	<0.1	<0.1	<0.1
2,4,6-trinitrotoluene	<0.1	<0.1	<0.1	<0.1	<0.1
RDX*	<0.3	<0.3	<0.3	<0.3	<0.3
HMX†	<6.	<6.	<6.	<6.	<6.
FIELD MEASUREMENTS					
pH	7.3	7.3	7.3	7.4	7.4
Conductivity‡	13700	13700	14900	16800	17000
Temperature °C	12.1	12.1	11.5	13	13

Notes: Concentrations in µg/L; OB-1D is duplicate sample of OB-1
* cyclotrimethylenetrinitramine
† cyclotetramethylenetetranitramine
‡ µmhos/cm

Analytical Data for Landfill Oil Lagoon
Orion Laboratories, 1990

ORION LABORATORIES
5007 PACIFIC HWY. EAST, SUITE C-6
FIFE, WASHINGTON 98424
(206) 922-9008
SINCE 1913

DATE: 12/2/90

1 Nov

CLIENT: FORT CARSON EENR
ATTN; JOHN CLOONAN
FORT CARSON, CO 80913

REPORT # 90-567-04
PROJECT: 0001AE

SAMPLE ID:	305-LFSP S-MM		0306-8000 TRICHL-RM	305-LFSP L-MM	0277-8100 PRAY-PT
LAB NUMBER:	1105-011		1109-006	1015-012	1015-015
ARSENIC	0.02	5.0	<0.1	<0.1	4.05
BARIUM	49.2	100	47.7	7.7 OK BT	<1.5
CADMIUM	1.6	0.8	<0.1	0.008	<0.01
CHROMIUM	7.3	5.0	2.6	<0.15	3.3
LEAD	31.0	5.0	<0.1	0.03	<0.5
MERCURY	<0.01	0.2	<0.01	<0.01	<0.01
SELENIUM	<0.2	1.0	<0.2	0.34	<0.2
SILVER	<0.7	5.0	<0.7	<0.7	<0.7
624 COMPOUNDS	<1.0		<1.0	<1.0	<1.0
625 COMPOUNDS	<1.0			<1.0	<1.0
PHENOL			8.6		
2,4 DIMETHYLPHENOL			33.7		
2 CHLOROPHENOL			1.0		
2,4 DICHLOROPHENOL			67.0		

ORION LABORATORIES
5007 PACIFIC HWY. EAST, SUITE C-6
FIFE, WASHINGTON 98424
(206) 922-9008
SINCE 1913

DATE: 12/2/90

TOXICITY CHARACTERISTIC LEACHING PROCEDURE EPA 1311

CLIENT: FORT CARSON EENR REPORT # 90567-04
ATTN: JOHN CLOONAN
FORT CARSON, CO 80913

SAMPLE ID:	0306-8000 TRICH-L-RM	305-LFSP L-MM	0277-8100 PBAY-PT	MCL (MG/L)
LAB NUMBER:	1109-006	1015-012	1015-015	
TCLP--METALS				
ARSENIC	SEE METALS REPORT 0001AE SECTION			5.0
BARIUM				100.0
CADMIUM				0.5
CHROMIUM				5.0
LEAD				5.0
MERCURY				0.2
SELENIUM				1.0
SILVER				5.0
TCLP--CHLORINATED PESTICIDES AND HERBICIDES				
CHLORDANE	<0.003	<0.003	<0.003	0.03
2,4-D	<1.0	<1.0	<1.0	10.0
ENDRIN	<0.002	<0.002	<0.002	0.02
HEPTACHLOR	<0.001	<0.001	<0.001	0.008
LINDANE	<0.04	<0.04	<0.04	0.4
METHOXYCHLOR	<1.0	<1.0	<1.0	10.0
TOXAPHENE	<0.05	<0.05	<0.05	0.5
2,4,5-TP (SILVEX)	<0.10	<0.10	<0.10	1.0

PAGE 2 TCLP REPORT REPORT #: 90567-04

TCLP--CHLORINATED VOLATILES

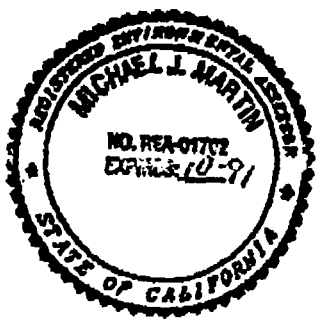
LAB NUMBER:	1109-006	1015-012	1015-015	MCL	MG/L
CARBON TETRACHLORIDE	<0.003	<0.003	<0.003	0.03	
CHLOROBENZENE	<10.0	<10.0	<10.0	100.0	
CHLOROFORM	<0.6	<0.6	<0.6	6.0	
1,4 DICHLORO-BENZENE	<0.05	<0.05	<0.05	0.5	
1,2 DICHLORO-ETHANE	<0.07	<0.07	<0.07	0.7	
1,1 DICHLORO-ETHYLENE	<0.013	<0.013	<0.013	0.13	
2,4 DINITRO-TOLUENE	<0.002	<0.002	<0.002	0.02	
HEXACHLORO-BENZENE	<0.013	<0.013	<0.013	0.13	
HEXACHLORO-BUTADIENE	<0.05	<0.05	<0.05	0.5	
HEXACHLORO-ETHANE	<0.3	<0.3	<0.3	3.0	
TETRACHLORO-ETHYLENE	<0.07	<0.07	<0.07	0.7	
TRICHLORO-ETHYLENE	<40.0	<40.0	<40.0	400.0	
VINYL CHLORIDE	<0.02	<0.02	<0.02	0.2	
TCLP-PHENOLS					
PENTACHLORO-PHENOL	>5.0	<0.5	<0.5	5.0	

LAB NUMBER:	1109-006	1015-012	1015-015	MCL MG/L
2,4,5 TRICHLORO-PHENOL	>2.0	<0.2	<0.2	2.0
2,4,6 TRICHLORO-PHENOL	37.7	<0.2	<0.2	2.0
TCLP--CRESOLS				
O-CRESOL	<20.0	<20.0	<20.0	200.0
M-CRESOL	<20.0	<20.0	<20.0	200.0
P-CRESOL	33.7	<20.0	<20.0	200.0
CRESOL	<20.0	<20.0	<20.0	200.0
TCLP--BENZENE DERIVATIVES, OTHER				
BENZENE	<0.05	<0.05	<0.05	0.5
NITROBENZENE	<0.2	<0.2	<0.2	2.0
METHYL ETHYL KETONE	<20.0	<20.0	<20.0	200.0
PYRIDINE	<0.5	<0.5	<0.5	5.0

REPORTED IN MG/L (PPM) UNLESS OTHERWISE NOTED.

BY: MJMartin

MICHAEL J. MARTIN
LABORATORY DIRECTOR MEMBER: AOAC, ACS, AIHA



ORION LABORATORIES
5007 PACIFIC HWY. EAST, SUITE C-6
FIFE, WASHINGTON 98424
(206) 922-9008
SINCE 1913

DATE: 12/2/90

CLIENT: FORT CARSON EENR
ATTN: JOHN CLOONAN
FORT CARSON, CO 80913

REPORT # 90567-04
PROJECT: 0001AE

SAMPLE ID:	305-LFSP S-MM	0306-8000 TRICH-L-RM	305-LFSP L-MM	0277-8100 PBAY-PT
LAB NUMBER:	1105-011	1109-006	1015-012	1015-015
REACTIVITY:	N/R	N/R	N/R	N/R
IGNITABILITY:	N/I	N/I	N/I	N/I
CORROSIVITY:	N/C	CORR	N/C	N/C
pH:	6.3	-0.76	7.1	
FLASH POINT: DEGREES F	>200	>200	>200	>200

EPA METHOD FOR HAZARDOUS WASTE CHARACTERISTICS, METHOD NUMBERS 1010, 1110, 8.3.

BY: MJ Martin

MICHAEL J. MARTIN
LABORATORY DIRECTOR
MEMBER: AOAC, ACS, AIHA

REGISTERED ENVIRONMENTAL ASSESSOR
MICHAEL J. MARTIN
NO. REA-01702
EXPIRES 10-91
STATE OF CALIFORNIA

PAGE 2 0001AE FORT CARSON 90-567-04

LAB NUMBER:	1105011	1109006	1015012	1015015
2,4,6 TRICHLOROPHENOL		37.7		
2 NITROPHENOL		110.2		
2 CHLORO-2-METHYLPHENOL		1.6		
608 COMPOUNDS	<1.0	<1.0	<1.0	<1.0

BY:

MJ Martin

MICHAEL J. MARTIN
LABORATORY DIRECTOR
MEMBER: AOAC, ACS, AIHA

REPORTED IN MG/L (PPM) UNLESS OTHERNISE NOTED.

REGISTERED ENVIRONMENTAL ASSESSOR
MICHAEL J. MARTIN
NO. REA-0170
EXPIRES 10-91
STATE OF CALIFORNIA

Analytical Data for Landfills 1, 2, 5, 6, and 11, and Range 1
Rinehart, 1993

Landfill #1
Table 2-8

To: John B. Cloonan
Hq. Fort Carson & 4th Inf. Div. (Mech.)
AFZC-ECM-EC
Building 302
Fort Carson, Colorado 80913

Reference 930504
Dec. 6, 1993

Subject: BPA-DAKF06-91-A-0136
Landfill #1

Comments: Analytical data are attached. All metal values are within TCLP specifications.

Limits for TTOs are given as 10mcg/l in CFR 48, No. 137, July 15,

1983, Pg. 32483.

Robert W. Rinehart

Robert W. Rinehart, Sr., Ph.D.

LANDFILL #1

METALS:

WELL	MG/L			
	Ba	Cr	Cd	Pb
1-3	0.039	0.004	0.016	0.186
	Ag	Hg	As	Se
	0.025	0.0010	0.406	0.644

TTO: Methylene chloride - 55 mcg/l

PH: 7.59

CONDUCTIVITY: 18,900

Landfill #2
Table 2-3

RINEHART LABORATORIES, INC.

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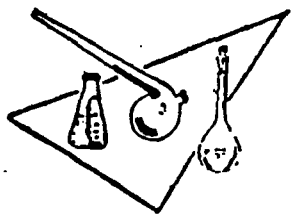

R. W. RINEHART, Sr., Ph.D., Pres.

To: John B. Cloonan
Hq. Fort Carson & 4th Inf. Div. (Mech.)
AFZC-ECM-EC
Building 302
Fort Carson, Colorado 80913

Reference 930504
Dec. 6, 1993

Subject: BPA-DAKF06-91-A-0136
Landfill #2

Comments: Selenium values in well 70 through 81 are above TCLP limits. Conductivity data show little relationship between wells and the stream.

Robert W. Rinehart

Robert W. Rinehart, Sr., Ph.D.

LANDFILL #2

TABLE #1 - METALS

WELL	MG/L			
	Ba	Cr	Cd	Pb
Sample:				
61	0.057	0.0026	0.010	0.133
62	0.047	0.0086	0.013	0.128
63	0.031	0.0043	0.013	0.144
64	0.058	0.0017	0.009	0.096
65	0.047	0.0043	0.012	0.144
66	0.078	0.0043	0.008	0.091
67	0.023	0.0086	0.012	0.138
68	0.023	0.0086	0.012	0.126
70	<0.006	0.0070	0.021	0.229
71	0.049	0.0044	0.012	0.170
72	0.006	0.0026	0.017	0.222
73	0.132	0.0132	0.012	0.173
74	0.006	0.0044	0.018	0.222
75	0.066	0.0044	0.012	0.146
76	0.053	0.0088	0.014	0.184
81	0.026	0.0044	0.015	0.195

16

TABLE #1 - METALS

WELL	MG/L			
	Ag	Hg	Se	As
Sample:				
61	0.015	.0004	0.380	0.371
62	0.017	.0001	0.746	0.503
63	0.017	.0001	0.804	0.380
64	0.012	.0004	0.559	0.306
65	0.017	.0008	0.684	0.414
66	0.012	.0012	0.444	0.268
67	0.017	<.0001	0.724	0.850
68	0.016	<.0001	0.697	0.447
70	0.022	.0012	2.50	1.134
71	0.016	.0002	1.33	0.638
72	0.022	.0014	2.07	0.573
73	0.016	.0003	1.42	0.727
74	0.026	.0005	2.67	0.861
75	0.015	.0008	1.41	0.564
76	0.020	.0008	1.32	0.537
81	0.019	.0058	1.58	0.756

TABLE #2 - PH AND SPECIFIC CONDUCTIVITY

WELL #	PH	CONDUCTIVITY (UMHOS/CM)
61	8.40	14,000
62	7.81	13,000
63	7.80	14,500
64	7.60	10,000
65	7.71	15,400
66	7.79	13,000
67	7.90	18,000
68	7.80	17,000
70	7.80	30,000
71	7.82	14,900
72	7.85	25,800
73	8.01	26,900
74	8.30	35,000
75	7.50	14,900
76	7.25	17,400
81	7.58	19,400

Total toxic organics — 130 organic cmpds. on the major list

TABLE #3 - TTO

Volatiles

2-61,64,66,67,68,70,71,72,73,74,75,76,81	none detected	<5mcg/L
2-62	1,1,2-Trichloro-1,2, 2-trifluoroethane	612mcg/L
2-63	Methylene Chloride	142mcg/L
2-65	1,1,2-Trichloro-1,2, 2-trifluoroethane	434mcg/L
	Methylene Chloride	110mcg/L

Acid Extract

	none detected	<5mcg/L

Base/Neutral Extract

	none detected	<5mcg/L

1 microgram.

Landfill # 4
Inac 2-4

RINEHART LABORATORIES, INC.

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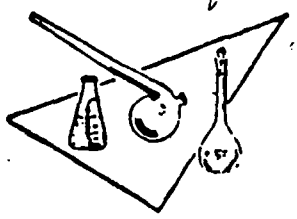

R. W. RINEHART, Sr., Ph.D., Pres.

To: John B. Cloonan
Hq. Fort Carson & 4th Inf. Div. (Mech.)
AFZC-ECM-EC
Building 302
Fort Carson, Colorado 80913

Reference 930504
Dec. 6, 1993

Subject: BPA-DAKF06-91-A-0136
Landfill #4

Comments: Selenium value for Downstream is above TCLP limit.

Upstream value is near limit and selenium may have come in from upstream.

Robert W. Rinehart

Robert W. Rinehart, Sr., Ph.D.

LANDFILL #4

TABLE #1 - METALS

WELL	MG/L			
	Ba	Cr	Cd	Pb
1	0.023	0.158	0.0175	0.208
2	0.074	0.0084	0.0111	0.122
3	0.068	0.0021	0.0095	0.116
4	0.159	0.0021	0.0071	0.109
UPSTREAM	0.122	0.0162	0.0014	0.042
DOWNSTREAM	0.132	0.0054	0.0024	0.062

LANDFILL #4

TABLE #1 - METALS

WELL	MG/L			
	Ag	Hg	Se	As
1	0.0278	0.0001	0.907	3.70
2	0.0148	<0.0001	0.602	1.44
3	0.0118	0.0001	0.441	1.61
4	0.0099	0.0001	0.379	0.96
UPSTREAM	0.0013	0.0003	0.971	0.126
DOWNSTREAM	0.0026	0.0003	3.220	0.117

TABLE #2 - PH, CONDUCTIVITY

WELL:	pH	CONDUCTIVITY
1	7.59	20,500
2	8.00	13,900
3	7.79	20,100
4	8.05	7,000
UPSTREAM	7.70	2,040
DOWNSTREAM	8.10	3,300

TABLE #3 - TTO

Volatiles & Semivolatiles		
4-1, 4-2, 4-3, 4-4, 4-in, 4-out	none detected	<5mcg/L
Acid Extract		
4-1, 4-2, 4-3, 4-4, 4-in, 4-out	none detected	<5mcg/L
Base/Neutral Extract		
4-1, 4-2, 4-3, 4-4, 4-in, 4-out	none detected	<5mcg/L

Landfill #5
Title 2-5

Reference No. 930504
November 9, 1993

To: Mr. John P. Cloonan
Hq. Fort Carson & 4th Inf. Div. (Mech.)
AFZC-EGM-EC
Building 2C2
Fort Carson, Colorado 80913

Subject: EPA-DAKF06-91-A-0136
Landfill 5

Comments:

Analytical data are attached. Tables 2 and 4 contain additional data collected on water removed while conditioning selected wells. You are not charged for these data. Table 5 lists mandatory limits for the TCLP metals.

Table 6 describes total toxic organics in the wells. Alkanes, alkenes, dienes and alkynes are not part of total toxic organics but are listed as a matter of interest. These are products of microbial degradation of hydrocarbons and other organic compounds. These are consistent with old landfill effluents.

Robert W. Rinehart

Robert W. Rinehart, Sr., Ph. D.

TABLE 1 TCLP METALS DATA

WELL	MG/L			
	Ba	Cr	Cd	Pb
5-1	0.1001	<0.0023	0.0102	0.1004
5-2	0.1168	0.0136	0.0085	0.0853
5-3	0.0667	0.0023	0.0089	0.6798
5-4	0.0889	0.0091	0.0057	0.0526
5-5	0.1223	0.0114	0.0086	0.0736
5-6	0.0334	<0.0023	0.0224	0.2091
5-7	0.0278	0.0114	0.0148	0.1425
5-8	0.1279	0.0091	0.0063	0.0677
5-9	0.1112	0.0034	0.0055	0.0514
5-10	0.0667	0.0034	0.0082	0.1974
5-11	0.0889	0.0045	0.0061	0.0584
UPSTREAM	0.1557	0.0023	0.0055	0.0689
DOWNSTREAM	0.1446	0.0023	0.0066	0.0712

TABLE 1 TCLP METALS DATA

WELL	MG/L			
	Ag	Hg	Se	As
5-1	0.0180	<0.0001	0.220	0.629
5-2	0.0128	0.0002	0.131	0.615
5-3	0.0128	<0.0001	0.448	1.150
5-4	0.0076	0.0004	0.142	0.537
5-5	0.0116	<0.0001	0.386	1.400
5-6	0.0404	<0.0001	0.959	2.890
5-7	0.0264	<0.0001	0.512	1.620
5-8	0.0104	0.0104	0.203	0.251
5-9	0.0088	<0.0001	0.161	0.078
5-10	0.0160	0.0001	0.567	0.992
5-11	0.0104	0.0007	0.220	0.294
UPSTREAM	0.0072	0.00082	0.196	0.204
DOWNSTREAM	0.0084	0.00049	0.196	0.070

TABLE 2 PAGE 1 OF 2

TCLP METALS DATA ON INITIAL STANDING WATER IN SELECTED WELLS

WELL	MG/L			
	Ba	Cr	Cd	Pb
5-1	0.0889	0.0114	0.0093	0.1051
5-5A	0.0889	0.0091	0.0093	0.0934
5-5B	0.1001	0.0091	0.0087	0.0841
5-6	0.1112	<0.0023	0.0112	0.1402
5-7	0.1279	<0.0023	0.0075	0.0724
5-8	0.3725	0.0091	0.0061	0.654
5-11	0.2002	<0.0023	0.0037	0.1425

TABLE 2 PAGE 2 OF 2

TCLP METALS DATA ON INITIAL STANDING WATER IN SELECTED WELLS

WELL	MG/L			
	Ag	Hg	Se	As
5-1	0.0161	<0.0001	0.214	1.076
5-5A	0.0160	<0.0001	0.628	1.200
5-5B	0.0108	<0.0001	0.257	1.120
5-6	0.0104	0.00012	0.197	0.691
5-7	0.0088	0.0001	0.236	0.159
5-8	0.0084	<0.0001	0.142	0.140
5-11	0.0024	<0.0001	0.070	0.103

TABLE 3 PH AND SPECIFIC CONDUCTIVITY

WELL #	PH	CONDUCTIVITY (UMHOS/CM)
1	7.6	10,900
2	7.7	8,870
3	7.7	10,500
4	8.3	6,100
5	8.0	10,800
6	8.1	20,640
7	7.7	10,760
8	7.8	8,200
9	7.6	6,200
10	8.1	10,200
11	7.7	7,000
UPSTREAM	8.5	7,100
DOWNSTREAM	8.4	7,300

TABLE 4 PH AND SPECIFIC CONDUCTIVITY ON INITIAL STANDING WATER IN SELECTED WELLS

EXTRA	PH	CONDUCTIVITY (UMHOS/CM)
5-1	7.6	12,000
5-5A	8.0	13,800
5-5B	8.0	9,100
6	8.1	9,100
7	7.7	8,000
8	7.8	7,000
11	7.7	3,400

TABLE 5 CONTAMINANTS IN EXTRACTION PROCEDURE EXTRACT

Contaminant	Max. allowed mg/l
Arsenic	5.0
Barium	100
Cadmium	1.0
Chromium	5.0
Lead	5.0
Mercury	0.2
Selenium	1.0
Silver	5.0

Reference No. 930504
November 9, 1993

TABLE 6 - TOTAL TOXIC ORGANICS

LANDFILL 5 - SAMPLES 1 THROUGH 11 - UPSTREAM, DOWNSTREAM

Volatiles & Semivolatiles	None detected	<5mcg/L
Base/Neutral	None detected	<5mcg/L
Acid	None detected	<5mcg/L

NOTE: Alkanes, alkenes, dienes and alkynes were detected.

landfill #6
DRMO-6

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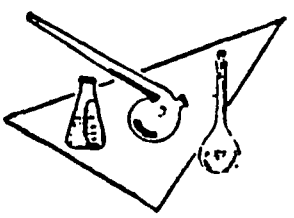

R. W. RINEHART, Sr., Ph.D., Pres.

To: John B. Cloonan
Hq. Fort Carson & 4th Inf. Div. (Mech.)
AFZC-ECM-EC
Building 302
Fort Carson, Colorado 80913

Reference 930504
Dec. 6, 1993

Subject: BPA-DAKF06-91-A-0136
Landfill #6

Comments: All metals are below TCLP limits.

Conductivity levels show little relation of wells and the stream.

Robert W. Rinehart

Robert W. Rinehart, Sr., Ph.D.

LANDFILL #6

TABLE #1 - METALS

WELL	MG/L			
	Ba	Cr	Cd	Pb
6-A	0.078	0.0086	0.0013	0.041
6-3	0.109	0.0730	0.0070	0.096
6-5	0.141	0.0086	0.0082	0.090
UPSTREAM	0.156	<0.0020	0.0020	0.035
DOWNSTREAM	<0.006	0.0330	0.0053	0.070

LANDFILL #6

TABLE #1 - METALS

WELL	MG/L			
	Ag	Hg	Se	As
6-A	0.0010	<0.0001	0.0036	0.011
6-3	0.0104	0.0001	0.3060	0.107
6-5	0.0111	0.0002	0.2710	0.212
UPSTREAM	0.0007	0.0002	0.0690	0.127
DOWNSTREAM	0.0046	<0.0001	0.0360	0.004

TABLE #2 - PH, CONDUCTIVITY

WELL:	pH	CONDUCTIVITY
6-A	7.42	1,400
6-3	7.54	12,400
6-5	7.31	10,600
UPSTREAM	8.32	2,200
DOWNSTREAM	8.20	4,400

TABLE #3 - TTO

Volatiles & Semivolatiles

6-3 & 6-5	none detected	<5mcg/L
6-A	Tetrachloroethene	280mcg/L
6-in	Methylene Chloride	134mcg/L
6-out	none detected	<5mcg/L

Acid Extract

6-3, 6-5, 6-A	none detected	<5mcg/L
6-in, 6-out	none detected	<5mcg/L

Base/Neutral Extract

6-3, 6-5, 6-A	none detected	<5mcg/L
6-in, 6-out	none detected	<5mcg/L

Landfill #11
Table 2-7

RINEHART LABORATORIES, INC.

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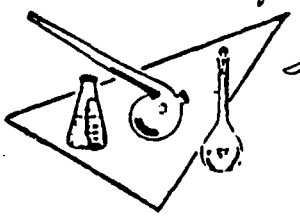

R. W. RINEHART, Sr., Ph.D., Pres.

To: John B. Cloonan
Hq. Fort Carson & 4th Inf. Div. (Mech.)
AFZC-ECM-EC
Building 302
Fort Carson, Colorado 80913

Reference 930504
Dec. 6, 1993

Subject: BPA-DAKF06-91-A-0136
Landfill #11

Comments: All metals are within TCLP limits.

Conductivity data show no relation of wells and stream.

Robert W. Rinehart

Robert W. Rinehart, Sr., Ph.D.

LANDFILL #11

TABLE #1 - METALS

WELL	MG/L			
	Ba	Cr	Cd	Pb
11-1	0.105	0.004	0.0027	0.045
11-2	0.137	0.009	0.0045	0.069
11-3	0.078	0.007	0.0061	0.080
DH2	0.208	0.005	0.0067	0.120
UPSTREAM	0.040	<0.002	0.0021	0.030
DOWNSTREAM	0.036	<0.002	0.0014	0.028

LANDFILL #11

TABLE #1 - METALS

WELL	MG/L			
	Ag	Hg	Se	As
11-1	0.0035	<0.0001	0.050	0.078
11-2	0.0028	<0.0001	0.162	0.065
11-3	0.0090	<0.0001	0.182	0.067
DH2	0.0071	0.0001	0.053	0.011
UPSTREAM	0.0014	<0.0001	<0.0004	0.009
DOWNSTREAM	0.0032	0.0008	0.0178	0.011

TABLE #2 - PH, CONDUCTIVITY

WELL:	pH	CONDUCTIVITY
1	7.50	3,000
2	7.60	5,600
3	7.55	6,600
DH-2	7.81	5,150
UPSTREAM	8.14	1,300
DOWNSTREAM	7.32	1,300

TABLE #3 - TTO

Volatiles

11-1,2,DH2,in	none detected	<5mcg/L
11-3	Methylene Chloride	246mcg/L
	1,2-Dichloroethane	42mcg/L
11-out	Methylene Chloride	80mcg/L

Acid Extract

11-1,2,3,DH2,in,out	none detected	<5mcg/L

Base/Neutral Extract

11-1,2,3,DH2,in,out	none detected.	<5mcg/L

1993 Results

Range #1

Table 2-8

RINEHART LABORATORIES, INC.

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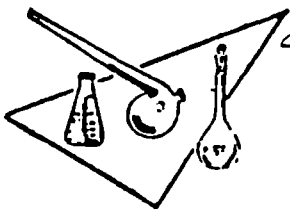

R. W. RINEHART, Sr., Ph.D., Pres.

To: John B. Cloonan
Hq. Fort Carson & 4th Inf. Div. (Mech.)
AFZC-ECM-EC
Building 302
Fort Carson, Colorado 80913

Reference 930504
Dec. 6, 1993

Subject: BPA-DAKF06-91-A-0136
Range #1

Comments: Selenium values are out of TCLP specifications.

No detectable organic contamination.

Robert W. Rinehart

Robert W. Rinehart, Sr., Ph.D.

RANGE #1

TABLE #1 - METALS

WELL	MG/L			
	Ba	Cr	Cd	Pb
2	0.068	0.008	0.014	0.160
3	0.057	0.013	0.017	0.179
4	0.040	0.013	0.016	0.174

RANGE #1

TABLE #1 - METALS

WELL	MG/L			
	Ag	Hg	Se	As
2	0.023	0.0003	5.57	2.31
3	0.027	<0.0001	5.10	2.17
4	0.028	0.0003	6.69	1.64

TABLE #2 - PH, CONDUCTIVITY

WELL:	pH	CONDUCTIVITY
2	8.10	15,500
3	8.11	22,000
4	8.10	15,900

TABLE #3 - TTO

Volatiles & Semivolatiles		
OB-2, OB-3, OB-4	none detected	<5mcg/L
Acid Extract		
OB-2, OB-3, OB-4	none detected	<5mcg/L
Base/Neutral Extract		
OB-2, OB-3, OB-4	none detected	<5mcg/L

Analytical Data for Landfill Oil Lagoon
RUST, 1994

RUST ENVIRONMENT & INFRASTRUCTURE

Fax Transmittal

RUST ENVIRONMENT & INFRASTRUCTURE

Mark M. Scott, PE
Senior Engineer

7710 N. Union Blvd., Suite 102
Colorado Springs, CO 80920-4079
Tel. (719) 528-6700
FAX (719) 531-6565

Date: 4/11/94

Time:

To: Robert Noyes

Company: Ft. Carson

City/State:

Fax Number: 526-1705

From: Mark Scott

Job/Project No:

Total Pages Including This Page: ~~8~~ 19

Comments: Draft Analytical Report on Oil/Grit Pit for your review. I will keep at the rest of today and most of tomorrow.

Got your message. Call back if it is critical we talk today otherwise I will call tomorrow or early Wednesday

For Originator:

Return Original ☐ Yes ☐ No ☐ Pickup

For Operator:

Date Sent _____ Time _____ By _____

In case of transmission problems, please call: (303) 694-6660

Rev. 7/93

F014/General

TCL Semivolatile Organics
Method 8270

(cont.)

DRAFT

Client Name: RUST Environment and Infrastructure
Client ID: COMP-3/VCOMP-3-3
Lab ID: 034356-0003-SA
Matrix: SOIL
Authorized: 18 MAR 94
Sampled: 17 MAR 94
Received: 18 MAR 94
Prepared: 25 MAR 94
Analyzed: 07 APR 94

Parameter	Result	Units	Reporting Limit	
4-Nitroaniline	ND	ug/kg	32000	
4,6-Dinitro-2-methylphenol	ND	ug/kg	32000	
N-Nitrosodiphenylamine	ND	ug/kg	6600	
4-Bromophenyl phenyl ether	ND	ug/kg	6600	
Hexachlorobenzene	ND	ug/kg	6600	
Pentachlorophenol	ND	ug/kg	32000	
Phenanthrene	6400	ug/kg	6600	J
Anthracene	ND	ug/kg	6600	
Di-n-butyl phthalate	ND	ug/kg	6600	
Fluoranthene	ND	ug/kg	6600	
Pyrene	1400	ug/kg	6600	J
Butyl benzyl phthalate	2200	ug/kg	6600	J
3,3'-Dichlorobenzidine	ND	ug/kg	13000	
Benzo(a)anthracene	ND	ug/kg	6600	
bis(2-Ethylhexyl)phthalate	21000	ug/kg	6600	
Chrysene	ND	ug/kg	6600	
Di-n-octyl phthalate	2400	ug/kg	6600	J
Benzo(b)fluoranthene	ND	ug/kg	6600	
Benzo(k)fluoranthene	ND	ug/kg	6600	
Benzo(a)pyrene	ND	ug/kg	6600	
Indeno(1,2,3-cd)pyrene	ND	ug/kg	6600	
Dibenz(a,h)anthracene	ND	ug/kg	6600	
Benzo(g,h,i)perylene	ND	ug/kg	6600	

Surrogate	Recovery	
Nitrobenzene-d5	ND	%
2-Fluorobiphenyl	ND	%
Terphenyl-d14	ND	%
Phenol-d5	ND	%
2-Fluorophenol	ND	%
2,4,6-Tribromophenol	ND	%

Dilution factor is 20. All results and limits are corrected for dilution.

J = Result is detected below the reporting limit or is an estimated concentration.
ND = Not Detected

Reported By: Paul Smith

Approved By: Audrey Verniere

TCL Semivolatile Organics
Method 8270

DRAFT

Client Name: RUST Environment and Infrastructure
Client ID: COMP-3/VCOMP-3-3
Lab ID: 034356-0003-SA
Matrix: SOIL — Sampled: 17 MAR 94 — Prepared: 25 MAR 94
Authorized: 18 MAR 94 — Received: 18 MAR 94 — Analyzed: 07 APR 94

Parameter	Result	Units	Reporting Limit	
Phenol	ND	ug/kg	6600	
bis(2-Chloroethyl) ether	ND	ug/kg	6600	
2-Chlorophenol	ND	ug/kg	6600	
1,3-Dichlorobenzene	ND	ug/kg	6600	
1,4-Dichlorobenzene	ND	ug/kg	6600	
Benzyl alcohol	ND	ug/kg	6600	
1,2-Dichlorobenzene	ND	ug/kg	6600	
2-Methylphenol	ND	ug/kg	6600	
bis(2-Chloroisopropyl)ether	ND	ug/kg	6600	
4-Methylphenol	ND	ug/kg	6600	
N-Nitroso-di-n-propylamine	ND	ug/kg	6600	
Hexachloroethane	ND	ug/kg	6600	
Nitrobenzene	ND	ug/kg	6600	
Isophorone	ND	ug/kg	6600	
2-Nitrophenol	ND	ug/kg	6600	
2,4-Dimethylphenol	ND	ug/kg	6600	
Benzoic acid	ND	ug/kg	32000	
bis(2-Chloroethoxy)methane	ND	ug/kg	6600	
2,4-Dichlorophenol	ND	ug/kg	6600	
1,2,4-Trichlorobenzene	ND	ug/kg	6600	
Naphthalene	6900	ug/kg	6600	
4-Chloroaniline	ND	ug/kg	6600	
Hexachlorobutadiene	ND	ug/kg	6600	
4-Chloro-3-methylphenol	ND	ug/kg	6600	
2-Methylnaphthalene	22000	ug/kg	6600	
Hexachlorocyclopentadiene	ND	ug/kg	6600	
2,4,6-Trichlorophenol	ND	ug/kg	6600	
2,4,5-Trichlorophenol	ND	ug/kg	32000	
2-Chloronaphthalene	ND	ug/kg	6600	
2-Nitroaniline	ND	ug/kg	32000	
Dimethyl phthalate	ND	ug/kg	6600	
Acenaphthylene	ND	ug/kg	6600	
3-Nitroaniline	ND	ug/kg	32000	
Acenaphthene	ND	ug/kg	6600	
2,4-Dinitrophenol	ND	ug/kg	32000	
4-Nitrophenol	ND	ug/kg	32000	
Dibenzofuran	1200	ug/kg	6600	J
2,4-Dinitrotoluene	ND	ug/kg	6600	
2,6-Dinitrotoluene	ND	ug/kg	6600	
Diethyl phthalate	ND	ug/kg	6600	
4-Chlorophenyl phenyl ether	ND	ug/kg	6600	
Fluorene	2700	ug/kg	6600	J

Dilution factor is 20. All results and limits are corrected for dilution.

J = Result is detected below the reporting limit or is an estimated concentration.
ND = Not Detected

Reported By: Paul Smith — Approved By: Audrey Verniero

TCL Semivolatile Organics (cont.)
Method 8270

DRAFT

Client Name: RUST Environment and Infrastructure
Client ID: COMP-2/VCOMP-2-3
Lab ID: 034356-0002-SA
Matrix SOIL Sampled: 17 MAR 94 Prepared: 25 MAR 94
Authorized: 18 MAR 94 Received: 18 MAR 94 Analyzed: 07 APR 94

Parameter	Result	Units	Reporting Limit	
4-Nitroaniline	ND	ug/kg	32000	
4,6-Dinitro-2-methylphenol	ND	ug/kg	32000	
N-Nitrosodiphenylamine	ND	ug/kg	6600	
4-Bromophenyl phenyl ether	ND	ug/kg	6600	
Hexachlorobenzene	ND	ug/kg	6600	
Pentachlorophenol	ND	ug/kg	32000	
Phenanthrene	10000	ug/kg	6600	
Anthracene	ND	ug/kg	6600	
Di-n-butyl phthalate	ND	ug/kg	6600	
Fluoranthene	2700	ug/kg	6600	J
Pyrene	2300	ug/kg	6600	J
Butyl benzyl phthalate	2100	ug/kg	6600	J
3,3'-Dichlorobenzidine	ND	ug/kg	13000	
Benzo(a)anthracene	1400	ug/kg	6600	J
bis(2-Ethylhexyl)phthalate	65000	ug/kg	6600	
Chrysene	1900	ug/kg	6600	J
Di-n-octyl phthalate	5300	ug/kg	6600	J
Benzo(b)fluoranthene	1600	ug/kg	6600	J
Benzo(k)fluoranthene	ND	ug/kg	6600	
Benzo(a)pyrene	690	ug/kg	6600	J
Indeno(1,2,3-cd)pyrene	ND	ug/kg	6600	
Dibenz(a,h)anthracene	ND	ug/kg	6600	
Benzo(g,h,i)perylene	720	ug/kg	6600	J

Surrogate	Recovery	
Nitrobenzene-d5	ND	%
2-Fluorobiphenyl	ND	%
Terphenyl-d14	ND	%
Phenol-d5	ND	%
2-Fluorophenol	ND	%
2,4,6-Tribromophenol	ND	%

Dilution factor is 20. All results and limits are corrected for dilution.

J = Result is detected below the reporting limit or is an estimated concentration.
ND = Not Detected

Reported By: Paul Smith Approved By: Audrey Vernifero

TCL Semivolatile Organics
Method 8270

DRAFT

Client Name: RUST Environment and Infrastructure
Client ID: COMP-2/VCOMP-2-3
Lab ID: 034356-0002-SA
Matrix: SOIL
Authorized: 18 MAR 94
Sampled: 17 MAR 94
Received: 18 MAR 94
Prepared: 25 MAR 94
Analyzed: 07 APR 94

Parameter	Result	Units	Reporting Limit	
Phenol	ND	ug/kg	6600	
bis(2-Chloroethyl) ether	ND	ug/kg	6600	
2-Chlorophenol	ND	ug/kg	6600	
1,3-Dichlorobenzene	ND	ug/kg	6600	
1,4-Dichlorobenzene	ND	ug/kg	6600	
Benzyl alcohol	ND	ug/kg	6600	
1,2-Dichlorobenzene	5100	ug/kg	6600	J
2-Methylphenol	ND	ug/kg	6600	
bis(2-Chloroisopropyl)ether	ND	ug/kg	6600	
4-Methylphenol	ND	ug/kg	6600	
N-Nitroso-di-n-propylamine	ND	ug/kg	6600	
Hexachloroethane	ND	ug/kg	6600	
Nitrobenzene	ND	ug/kg	6600	
Isophorone	ND	ug/kg	6600	
2-Nitrophenol	ND	ug/kg	6600	
2,4-Dimethylphenol	ND	ug/kg	6600	
Benzoic acid	ND	ug/kg	32000	
bis(2-Chloroethoxy)methane	ND	ug/kg	6600	
2,4-Dichlorophenol	ND	ug/kg	6600	
1,2,4-Trichlorobenzene	ND	ug/kg	6600	
Naphthalene	13000	ug/kg	6600	
4-Chloroaniline	ND	ug/kg	6600	
Hexachlorobutadiene	ND	ug/kg	6600	
4-Chloro-3-methylphenol	6000	ug/kg	6600	J
2-Methylnaphthalene	31000	ug/kg	6600	
Hexachlorocyclopentadiene	ND	ug/kg	6600	
2,4,6-Trichlorophenol	ND	ug/kg	6600	
2,4,5-Trichlorophenol	ND	ug/kg	32000	
2-Chloronaphthalene	ND	ug/kg	6600	
2-Nitroaniline	ND	ug/kg	32000	
Dimethyl phthalate	ND	ug/kg	6600	
Acenaphthylene	ND	ug/kg	6600	
3-Nitroaniline	ND	ug/kg	32000	
Acenaphthene	1500	ug/kg	6600	J
2,4-Dinitrophenol	ND	ug/kg	32000	
4-Nitrophenol	ND	ug/kg	32000	
Dibenzofuran	1600	ug/kg	6600	J
2,4-Dinitrotoluene	ND	ug/kg	6600	
2,6-Dinitrotoluene	ND	ug/kg	6600	
Diethyl phthalate	ND	ug/kg	6600	
4-Chlorophenyl phenyl ether	ND	ug/kg	6600	
Fluorene	2400	ug/kg	6600	J

Dilution factor is 20. All results and limits are corrected for dilution.

J = Result is detected below the reporting limit or is an estimated concentration.
ND = Not Detected

Reported By: Paul Smith

Approved By: Audrey Verniero

TCL Semivolatile Organics
Method 8270

(cont.)

DRAFT

Client Name: RUST Environment and Infrastructure
Client ID: COMP-1/VCOMP-1-3
Lab ID: 034356-0001-SA
Matrix: SOIL
Authorized: 18 MAR 94
Sampled: 17 MAR 94
Received: 18 MAR 94
Prepared: 25 MAR 94
Analyzed: 07 APR 94

Parameter	Result	Units	Reporting Limit	
4-Nitroaniline	ND	ug/kg	32000	
4,6-Dinitro-2-methylphenol	ND	ug/kg	32000	
N-Nitrosodiphenylamine	ND	ug/kg	6600	
4-Bromophenyl phenyl ether	ND	ug/kg	6600	
Hexachlorobenzene	ND	ug/kg	6600	
Pentachlorophenol	ND	ug/kg	32000	
Phenanthrene	6600	ug/kg	6600	
Anthracene	ND	ug/kg	6600	
Di-n-butyl phthalate	1100	ug/kg	6600	J
Fluoranthene	1200	ug/kg	6600	J
Pyrene	1600	ug/kg	6600	J
Butyl benzyl phthalate	2100	ug/kg	6600	J
3,3'-Dichlorobenzidine	ND	ug/kg	13000	
Benzo(a)anthracene	ND	ug/kg	6600	
bis(2-Ethylhexyl)phthalate	20000	ug/kg	6600	
Chrysene	ND	ug/kg	6600	
Di-n-octyl phthalate	1400	ug/kg	6600	J
Benzo(b)fluoranthene	ND	ug/kg	6600	
Benzo(k)fluoranthene	ND	ug/kg	6600	
Benzo(a)pyrene	ND	ug/kg	6600	
Indeno(1,2,3-cd)pyrene	ND	ug/kg	6600	
Dibenz(a,h)anthracene	ND	ug/kg	6600	
Benzo(g,h,i)perylene	ND	ug/kg	6600	

Surrogate	Recovery	
Nitrobenzene-d5	ND	%
2-Fluorobiphenyl	ND	%
Terphenyl-d14	ND	%
Phenol-d5	ND	%
2-Fluorophenol	ND	%
2,4,6-Tribromophenol	ND	%

Dilution factor is 20. All results and limits are corrected for dilution.

J = Result is detected below the reporting limit or is an estimated concentration.
ND = Not Detected

Reported By: Paul Smith

Approved By: Audrey Verniero

TCL Semivolatile Organics
Method 8270

DRAFT

Client Name: RUST Environment and Infrastructure
Client ID: COMP-1/VCOMP-1-3
Lab ID: 034356-0001-SA
Matrix SOIL
Authorized: 18 MAR 94

Sampled: 17 MAR 94
Received: 18 MAR 94

Prepared: 25 MAR 94
Analyzed: 07 APR 94

Parameter	Result	Units	Reporting Limit	
Phenol	ND	ug/kg	6600	
bis(2-Chloroethyl) ether	ND	ug/kg	6600	
2-Chlorophenol	ND	ug/kg	6600	
1,3-Dichlorobenzene	ND	ug/kg	6600	
1,4-Dichlorobenzene	ND	ug/kg	6600	
Benzyl alcohol	ND	ug/kg	6600	
1,2-Dichlorobenzene	ND	ug/kg	6600	
2-Methylphenol	ND	ug/kg	6600	
bis(2-Chloroisopropyl)ether	ND	ug/kg	6600	
4-Methylphenol	ND	ug/kg	6600	
N-Nitroso-di-n-propylamine	ND	ug/kg	6600	
Hexachloroethane	ND	ug/kg	6600	
Nitrobenzene	ND	ug/kg	6600	
Isophorone	ND	ug/kg	6600	
2-Nitrophenol	ND	ug/kg	6600	
2,4-Dimethylphenol	ND	ug/kg	6600	
Benzoic acid	ND	ug/kg	6600	
bis(2-Chloroethoxy)methane	ND	ug/kg	32000	
2,4-Dichlorophenol	ND	ug/kg	6600	
1,2,4-Trichlorobenzene	ND	ug/kg	6600	
Naphthalene	16000	ug/kg	6600	
4-Chloroaniline	ND	ug/kg	6600	
Hexachlorobutadiene	ND	ug/kg	6600	
4-Chloro-3-methylphenol	ND	ug/kg	6600	
2-Methylnaphthalene	32000	ug/kg	6600	
Hexachlorocyclopentadiene	ND	ug/kg	6600	
2,4,6-Trichlorophenol	ND	ug/kg	6600	
2,4,5-Trichlorophenol	ND	ug/kg	32000	
2-Chloronaphthalene	ND	ug/kg	6600	
2-Nitroaniline	ND	ug/kg	32000	
Dimethyl phthalate	ND	ug/kg	6600	
Acenaphthylene	ND	ug/kg	6600	
3-Nitroaniline	ND	ug/kg	32000	
Acenaphthene	ND	ug/kg	6600	
2,4-Dinitrophenol	ND	ug/kg	32000	
4-Nitrophenol	ND	ug/kg	32000	
Dibenzofuran	ND	ug/kg	6600	
2,4-Dinitrotoluene	ND	ug/kg	6600	
2,6-Dinitrotoluene	ND	ug/kg	6600	
Diethyl phthalate	ND	ug/kg	6600	
4-Chlorophenyl phenyl ether	ND	ug/kg	6600	
Fluorene	2900	ug/kg	6600	J

Dilution factor is 20. All results and limits are corrected for dilution.

J = Result is detected below the reporting limit or is an estimated concentration.
ND = Not Detected

Reported By: Paul Smith

Approved By: Audrey Vernfero

Metals

Total Metals

Client Name: RUST Environment and Infrastructure
Client ID: COMP-3/VCOMP-3-3
Lab ID: 034356-0003-SA
Matrix: SOIL Sampled: 17 MAR 94 Received: 18 MAR 94
Authorized: 18 MAR 94 Prepared: See Below Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date	
Antimony	7.0	mg/kg	6.0	6010	28 MAR 94	31 MAR 94	
Beryllium	0.52	mg/kg	0.20	6010	28 MAR 94	31 MAR 94	
Cadmium	10.5	mg/kg	0.50	6010	28 MAR 94	31 MAR 94	
Chromium	16.9	mg/kg	1.0	6010	28 MAR 94	31 MAR 94	
Copper	47.8	mg/kg	2.0	6010	28 MAR 94	31 MAR 94	
Lead	87.9	mg/kg	5.0	6010	28 MAR 94	31 MAR 94	
Nickel	12.0	mg/kg	4.0	6010	28 MAR 94	31 MAR 94	
Silver	ND	mg/kg	1.0	6010	28 MAR 94	31 MAR 94	
Zinc	138	mg/kg	2.0	6010	28 MAR 94	31 MAR 94	
Arsenic	3.7	mg/kg	1.0	7060	28 MAR 94	29 MAR 94	
Mercury	0.66	mg/kg	0.10	7471	24 MAR 94	24 MAR 94	
Selenium	0.19	mg/kg	1.0	7740	28 MAR 94	29 MAR 94	J
Thallium	ND	mg/kg	0.50	7841	28 MAR 94	29 MAR 94	

DRAFT

Note J : Result is detected below the reporting limit or is an estimated concentration.

ND = Not detected
NA = Not applicable

Reported By: Richard Persichitte Approved By: Richard Persichitte

Metals

Total Metals

Client Name: RUST Environment and Infrastructure
Client ID: COMP-2/YCOMP-2-3
Lab ID: 034356-0002-SA
Matrix: SOIL Sampled: 17 MAR 94 Received: 18 MAR 94
Authorized: 18 MAR 94 Prepared: See Below Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date	
Antimony	ND	mg/kg	6.0	6010	28 MAR 94	31 MAR 94	
Beryllium	0.67	mg/kg	0.20	6010	28 MAR 94	31 MAR 94	
Cadmium	5.6	mg/kg	0.50	6010	28 MAR 94	31 MAR 94	
Chromium	24.4	mg/kg	1.0	6010	28 MAR 94	31 MAR 94	
Copper	87.0	mg/kg	2.0	6010	28 MAR 94	31 MAR 94	
Lead	313	mg/kg	5.0	6010	28 MAR 94	31 MAR 94	
Nickel	16.4	mg/kg	4.0	6010	28 MAR 94	31 MAR 94	
Silver	0.91	mg/kg	1.0	6010	28 MAR 94	31 MAR 94	J
Zinc	278	mg/kg	2.0	6010	28 MAR 94	31 MAR 94	
Arsenic	5.0	mg/kg	1.0	7060	28 MAR 94	29 MAR 94	
Mercury	0.12	mg/kg	0.10	7471	24 MAR 94	24 MAR 94	
Selenium	0.27	mg/kg	1.0	7740	28 MAR 94	29 MAR 94	J
Thallium	0.12	mg/kg	0.50	7841	28 MAR 94	29 MAR 94	J

DRAFT

Note J : Result is detected below the reporting limit or is an estimated concentration.

ND = Not detected
NA = Not applicable

Reported By: Richard Persichitte Approved By: Richard Persichitte

Metals

Total Metals

Client Name: RUST Environment and Infrastructure
Client ID: COMP-1/YCOMP-1-3
Lab ID: 034356-0001-SA
Matrix: SOIL Sampled: 17 MAR 94 Received: 18 MAR 94
Authorized: 18 MAR 94 Prepared: See Below Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date	
Antimony	ND	mg/kg	6.0	6010	28 MAR 94	31 MAR 94	
Beryllium	0.51	mg/kg	0.20	6010	28 MAR 94	31 MAR 94	
Cadmium	5.7	mg/kg	0.50	6010	28 MAR 94	31 MAR 94	
Chromium	28.6	mg/kg	1.0	6010	28 MAR 94	31 MAR 94	
Copper	37.1	mg/kg	2.0	6010	28 MAR 94	31 MAR 94	
Lead	119	mg/kg	5.0	6010	28 MAR 94	31 MAR 94	
Nickel	18.2	mg/kg	4.0	6010	28 MAR 94	31 MAR 94	
Silver	6.7	mg/kg	1.0	6010	28 MAR 94	31 MAR 94	
Zinc	127	mg/kg	2.0	6010	28 MAR 94	31 MAR 94	
Arsenic	4.2	mg/kg	0.50	7060	28 MAR 94	29 MAR 94	
Mercury	0.13	mg/kg	0.10	7471	24 MAR 94	24 MAR 94	
Selenium	0.26	mg/kg	0.50	7740	28 MAR 94	29 MAR 94	J
Thallium	ND	mg/kg	0.50	7841	28 MAR 94	29 MAR 94	

DRAFT

Note J : Result is detected below the reporting limit or is an estimated concentration.

ND = Not detected
NA = Not applicable

Reported By: Richard Persichitte Approved By: Richard Persichitte

Chlorinated Pesticides and PCB's
Target Compound List (TCL)
Method 8080

Client Name: RUST Environment and Infrastructure
Client ID: COMP-3/VCOMP-3-3
Lab ID: 034356-0003-SA
Matrix: SOIL Sampled: 17 MAR 94 Received: 18 MAR 94
Authorized: 18 MAR 94 Prepared: 25 MAR 94 Analyzed: 05 APR 94

Parameter	Result	Wet wt. Units	Reporting Limit
Aldrin	ND	ug/kg	34
Aroclor 1016	ND	ug/kg	660
Aroclor 1221	ND	ug/kg	660
Aroclor 1232	ND	ug/kg	660
Aroclor 1242	ND	ug/kg	660
Aroclor 1248	ND	ug/kg	660
Aroclor 1254	ND	ug/kg	660
Aroclor 1260	ND	ug/kg	660
alpha-BHC	ND	ug/kg	34
beta-BHC	ND	ug/kg	34
delta-BHC	ND	ug/kg	34
gamma-BHC (Lindane)	ND	ug/kg	34
alpha-Chlordane	ND	ug/kg	34
gamma-Chlordane	ND	ug/kg	34
4,4'-DDD	ND	ug/kg	66
4,4'-DDE	ND	ug/kg	66
4,4'-DDT	ND	ug/kg	66
Dieldrin	ND	ug/kg	66
Endosulfan I	ND	ug/kg	34
Endosulfan II	ND	ug/kg	66
Endosulfan sulfate	ND	ug/kg	66
Endrin	ND	ug/kg	66
Endrin ketone	ND	ug/kg	66
Heptachlor	ND	ug/kg	34
Heptachlor epoxide	ND	ug/kg	34
Methoxychlor	ND	ug/kg	340
Toxaphene	ND	ug/kg	3400

Surrogate	Recovery	
Tetrachloro-m-xylene	ND	%
Dibutyl chlorendate	ND	%
Decachlorobiphenyl	ND	%

DRAFT

ND = Not detected
NA = Not applicable

Reported By: Steven McKee Approved By:

Chlorinated Pesticides and PCB's
Target Compound List (TCL)
Method 8080

Client Name: RUST Environment and Infrastructure
Client ID: COMP-2/VCOMP-2-3
Lab ID: 034356-0002-SA
Matrix: SOIL Sampled: 17 MAR 94 Received: 18 MAR 94
Authorized: 18 MAR 94 Prepared: 25 MAR 94 Analyzed: 05 APR 94

Parameter	Result	Wet wt. Units	Reporting Limit
Aldrin	ND	ug/kg	34
Aroclor 1016	ND	ug/kg	660
Aroclor 1221	ND	ug/kg	660
Aroclor 1232	ND	ug/kg	660
Aroclor 1242	ND	ug/kg	660
Aroclor 1248	ND	ug/kg	660
Aroclor 1254	ND	ug/kg	660
Aroclor 1260	ND	ug/kg	660
alpha-BHC	ND	ug/kg	34
beta-BHC	ND	ug/kg	34
delta-BHC	ND	ug/kg	34
gamma-BHC (Lindane)	ND	ug/kg	34
alpha-Chlordane	ND	ug/kg	34
gamma-Chlordane	ND	ug/kg	34
4,4'-DDD	ND	ug/kg	66
4,4'-DDE	ND	ug/kg	66
4,4'-DDT	ND	ug/kg	66
Dieldrin	ND	ug/kg	66
Endosulfan I	ND	ug/kg	34
Endosulfan II	ND	ug/kg	66
Endosulfan sulfate	ND	ug/kg	66
Endrin	ND	ug/kg	66
Endrin ketone	ND	ug/kg	66
Heptachlor	ND	ug/kg	34
Heptachlor epoxide	ND	ug/kg	34
Methoxychlor	ND	ug/kg	340
Toxaphene	ND	ug/kg	3400

Surrogate	Recovery	
Tetrachloro-m-xylene	ND	%
Dibutyl chlorendate	ND	%
Decachlorobiphenyl	ND	%

DRAFT

ND = Not detected
NA = Not applicable

Reported By: Steven McKee

Approved By:

Chlorinated Pesticides and PCB's
Target Compound List (TCL)
Method 8080

Client Name: RUST Environment and Infrastructure
Client ID: COMP-1/VCOMP-1-3
Lab ID: 034356-0001-SA
Matrix: SOIL Sampled: 17 MAR 94 Received: 18 MAR 94
Authorized: 18 MAR 94 Prepared: 25 MAR 94 Analyzed: 05 APR 94

Parameter	Result	Wet wt. Units	Reporting Limit
Aldrin	ND	ug/kg	34
Aroclor 1016	ND	ug/kg	660
Aroclor 1221	ND	ug/kg	660
Aroclor 1232	ND	ug/kg	660
Aroclor 1242	ND	ug/kg	660
Aroclor 1248	ND	ug/kg	660
Aroclor 1254	ND	ug/kg	660
Aroclor 1260	ND	ug/kg	660
alpha-BHC	ND	ug/kg	34
beta-BHC	ND	ug/kg	34
delta-BHC	ND	ug/kg	34
gamma-BHC (Lindane)	ND	ug/kg	34
alpha-Chlordane	ND	ug/kg	34
gamma-Chlordane	ND	ug/kg	34
4,4'-DDD	ND	ug/kg	66
4,4'-DDE	ND	ug/kg	66
4,4'-DDT	ND	ug/kg	66
Dieldrin	ND	ug/kg	66
Endosulfan I	ND	ug/kg	34
Endosulfan II	ND	ug/kg	66
Endosulfan sulfate	ND	ug/kg	66
Endrin	ND	ug/kg	66
Endrin ketone	ND	ug/kg	66
Heptachlor	ND	ug/kg	34
Heptachlor epoxide	ND	ug/kg	34
Methoxychlor	ND	ug/kg	340
Toxaphene	ND	ug/kg	3400

Surrogate	Recovery	
Tetrachloro-m-xylene	ND	%
Dibutyl chlorendate	ND	%
Decachlorobiphenyl	ND	%

DRAFT

ND = Not detected
NA = Not applicable

Reported By: Steven McKee Approved By:

Volatile Organics
Target Compound List (TCL)
Method 8240

Client Name: RUST Environment and Infrastructure
Client ID: COMP-3/VCOMP-3-3
Lab ID: *034356-0003-SA*
Matrix: SOIL Sampled: 17 MAR 94 Received: 18 MAR 94
Authorized: 18 MAR 94 Prepared: 28 MAR 94 Analyzed: 29 MAR 94

Surrogate	Recovery	
1,2-Dichloroethane-d4	101	%

DRAFT

Note J : Result is detected below the reporting limit or is an estimated concentration.

ND = Not detected
NA = Not applicable

Reported By: Ann Fairbanks Approved By: Audrey Verniero

Volatile Organics
Target Compound List (TCL)
Method 8240

Client Name: RUST Environment and Infrastructure
Client ID: COMP-3/VCOMP-3-3
Lab ID: 034356-0003-SA
Matrix: SOIL Sampled: 17 MAR 94 Received: 18 MAR 94
Authorized: 18 MAR 94 Prepared: 28 MAR 94 Analyzed: 29 MAR 94

Parameter	Result	Wet wt. Units	Reporting Limit	
Acetone	ND	ug/kg	1000	
Benzene	ND	ug/kg	500	
Bromodichloromethane	ND	ug/kg	500	
Bromoform	ND	ug/kg	500	
Bromomethane	ND	ug/kg	1000	
2-Butanone (MEK)	ND	ug/kg	1000	
Carbon disulfide	ND	ug/kg	500	
Carbon tetrachloride	ND	ug/kg	500	
Chlorobenzene	ND	ug/kg	500	
Chloroethane	ND	ug/kg	1000	
Chloroform	ND	ug/kg	500	
Chloromethane	ND	ug/kg	1000	
Dibromochloromethane	ND	ug/kg	500	
1,1-Dichloroethane	ND	ug/kg	500	
1,2-Dichloroethane	ND	ug/kg	500	
1,1-Dichloroethene	ND	ug/kg	500	
1,2-Dichloroethene (total)	ND	ug/kg	500	
1,2-Dichloropropane	ND	ug/kg	500	
cis-1,3-Dichloropropene	ND	ug/kg	500	
trans-1,3-Dichloropropene	ND	ug/kg	500	
Ethylbenzene	860	ug/kg	500	
2-Hexanone	ND	ug/kg	1000	
Methylene chloride	240	ug/kg	500	J
4-Methyl-2-pentanone (MIBK)	ND	ug/kg	1000	
Styrene	ND	ug/kg	500	
1,1,2,2-Tetrachloroethane	ND	ug/kg	500	
Tetrachloroethene	ND	ug/kg	500	
Toluene	1800	ug/kg	500	
1,1,1-Trichloroethane	ND	ug/kg	500	
1,1,2-Trichloroethane	ND	ug/kg	500	
Trichloroethene	ND	ug/kg	500	
Vinyl acetate	ND	ug/kg	1000	
Vinyl chloride	ND	ug/kg	1000	
Xylenes (total)	6100	ug/kg	500	

Surrogate	Recovery	
Toluene-d8	115	%
4-Bromofluorobenzene	116	%

DRAFT

(continued on following page)

ND - Not detected
NA - Not applicable

Reported By: Ann Fairbanks Approved By: Audrey Verniero

Volatile Organics
Target Compound List (TCL)
Method 8240

Client Name: RUST Environment and Infrastructure
Client ID: COMP-2/VCOMP-2-3
Lab ID: 034356-0002-SA
Matrix: SOIL
Authorized: 18 MAR 94
Sampled: 17 MAR 94
Prepared: 28 MAR 94
Received: 18 MAR 94
Analyzed: 29 MAR 94

Surrogate	Recovery	
1,2-Dichloroethane-d4	95	%

Note J ; Result is detected below the reporting limit or is an estimated concentration.

ND = Not detected
NA = Not applicable

DRAFT

Reported By: Ann Fairbanks

Approved By: Audrey Verniero

Volatile Organics
Target Compound List (TCL)
Method 8240

Client Name: RUST Environment and Infrastructure
Client ID: COMP-2/VCOMP-2-3
Lab ID: 034356-0002-SA
Matrix: SOIL Sampled: 17 MAR 94 Received: 18 MAR 94
Authorized: 18 MAR 94 Prepared: 28 MAR 94 Analyzed: 29 MAR 94

Parameter	Result	Wet wt. Units	Reporting Limit	
Acetone	ND	ug/kg	2000	
Benzene	380	ug/kg	1000	J
Bromodichloromethane	ND	ug/kg	1000	
Bromoform	ND	ug/kg	1000	
Bromomethane	ND	ug/kg	2000	
2-Butanone (MEK)	ND	ug/kg	2000	
Carbon disulfide	ND	ug/kg	1000	
Carbon tetrachloride	ND	ug/kg	1000	
Chlorobenzene	ND	ug/kg	1000	
Chloroethane	ND	ug/kg	2000	
Chloroform	ND	ug/kg	1000	
Chloromethane	ND	ug/kg	2000	
Dibromochloromethane	ND	ug/kg	1000	
1,1-Dichloroethane	ND	ug/kg	1000	
1,2-Dichloroethane	ND	ug/kg	1000	
1,1-Dichloroethene	ND	ug/kg	1000	
1,2-Dichloroethene (total)	2200	ug/kg	1000	
1,2-Dichloropropane	ND	ug/kg	1000	
cis-1,3-Dichloropropene	ND	ug/kg	1000	
trans-1,3-Dichloropropene	ND	ug/kg	1000	
Ethylbenzene	7200	ug/kg	1000	
2-Hexanone	ND	ug/kg	2000	
Methylene chloride	430	ug/kg	1000	J
4-Methyl-2-pentanone (MIBK)	ND	ug/kg	2000	
Styrene	ND	ug/kg	1000	
1,1,2,2-Tetrachloroethane	ND	ug/kg	1000	
Tetrachloroethene	22000	ug/kg	1000	
Toluene	16000	ug/kg	1000	
1,1,1-Trichloroethane	ND	ug/kg	1000	
1,1,2-Trichloroethane	ND	ug/kg	1000	
Trichloroethene	3900	ug/kg	1000	
Vinyl acetate	ND	ug/kg	2000	
Vinyl chloride	ND	ug/kg	2000	
Xylenes (total)	43000	ug/kg	1000	

Surrogate	Recovery	
Toluene-d8	98	%
4-Bromofluorobenzene	103	%

DRAFT

(continued on following page)

ND = Not detected
NA = Not applicable

Reported By: Ann Fairbanks Approved By: Audrey Verniero

Volatile Organics
Target Compound List (TCL)
Method 8240

Client Name: RUST Environment and Infrastructure
Client ID: COMP-I/VCOMP-1-3
Lab ID: 034356-0001-SA
Matrix: SOIL Sampled: 17 MAR 94 Received: 18 MAR 94
Authorized: 18 MAR 94 Prepared: 28 MAR 94 Analyzed: 29 MAR 94

Surrogate	Recovery	
1,2-Dichloroethane-d4	119	%

Note J : Result is detected below the reporting limit or is an estimated concentration.

DRAFT

ND = Not detected
NA = Not applicable

Reported By: Ann Fairbanks Approved By: Audrey Verniero

Volatile Organics
Target Compound List (TCL)
Method 8240

Client Name: RUST Environment and Infrastructure
Client ID: COMP-1/VCOMP-1-3
Lab ID: 034356-0001-SA
Matrix: SOIL Sampled: 17 MAR 94 Received: 18 MAR 94
Authorized: 18 MAR 94 Prepared: 28 MAR 94 Analyzed: 29 MAR 94

Parameter	Result	Wet wt. Units	Reporting Limit	
Acetone	300	ug/kg	1000	J
Benzene	ND	ug/kg	500	
Bromodichloromethane	ND	ug/kg	500	
Bromoform	ND	ug/kg	500	
Bromomethane	ND	ug/kg	1000	
2-Butanone (MEK)	ND	ug/kg	1000	
Carbon disulfide	ND	ug/kg	500	
Carbon tetrachloride	ND	ug/kg	500	
Chlorobenzene	ND	ug/kg	500	
Chloroethane	ND	ug/kg	1000	
Chloroform	ND	ug/kg	500	
Chloromethane	ND	ug/kg	1000	
Dibromochloromethane	ND	ug/kg	500	
1,1-Dichloroethane	ND	ug/kg	500	
1,2-Dichloroethane	ND	ug/kg	500	
1,1-Dichloroethene	ND	ug/kg	500	
1,2-Dichloroethene (total)	ND	ug/kg	500	
1,2-Dichloropropane	ND	ug/kg	500	
cis-1,3-Dichloropropene	ND	ug/kg	500	
trans-1,3-Dichloropropene	ND	ug/kg	500	
Ethylbenzene	2700	ug/kg	500	
2-Hexanone	ND	ug/kg	1000	
Methylene chloride	250	ug/kg	500	J
4-Methyl-2-pentanone (MIBK)	ND	ug/kg	1000	
Styrene	ND	ug/kg	500	
1,1,2,2-Tetrachloroethane	ND	ug/kg	500	
Tetrachloroethene	ND	ug/kg	500	
Toluene	5600	ug/kg	500	
1,1,1-Trichloroethane	ND	ug/kg	500	
1,1,2-Trichloroethane	ND	ug/kg	500	
Trichloroethene	ND	ug/kg	500	
Vinyl acetate	ND	ug/kg	1000	
Vinyl chloride	ND	ug/kg	1000	
Xylenes (total)	20000	ug/kg	500	

Surrogate	Recovery	
Toluene-d8	131	%
4-Bromofluorobenzene	131	%

(continued on following page)

DRAFT

ND = Not detected
NA = Not applicable

Reported By: Ann Fairbanks Approved By: Audrey Verniero

RUST ENVIRONMENT & INFRASTRUCTURE

Fax Transmittal

RUST ENVIRONMENT & INFRASTRUCTURE
Mark M. Scott, PE
Senior Engineer
7710 N. Union Blvd., Suite 102
Colorado Springs, CO 80920-4079
Tel (719) 528-6700
FAX (719) 531-6565

Date: 5/23

Time:

To: Robert Noyes

Company: FtCarson/ECAM

City/State:

Fax Number: 526-1705

From: Mark Scott

Job/Project No:

Total Pages Including This Page: 8

Comments: TCLP Results I recieved last Friday, while I was out. I will be out most of today and tomorrow.

For Originator:

Return Original ☒ Yes ☐ No ☐ Pickup

For Operator:

Date Sent _____ Time _____ By _____

In case of transmission problems, please call: (303) 694-6660

Toxicity Characteristic Metals
TCLP Leachate

Client Name: RUST Environment and Infrastructure
Client ID: COMP-1/VCOMP-1-3
Lab ID: 035093-0001-SA
Matrix: SOIL

Sampled: 17 MAR 94
Received: 18 MAR 94
Authorized: 27 APR 94

Leached: 12 MAY 94
Prepared: See Below
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date	
Arsenic	ND	mg/L	0.20	6010	16 MAY 94	18 MAY 94	
Barium	1.8	mg/L	0.020	6010	16 MAY 94	18 MAY 94	B
Cadmium	ND	mg/L	0.010	6010	16 MAY 94	18 MAY 94	
Chromium	ND	mg/L	0.020	6010	16 MAY 94	18 MAY 94	
Lead	0.14	mg/L	0.10	6010	16 MAY 94	18 MAY 94	
Selenium	ND	mg/L	0.40	6010	16 MAY 94	18 MAY 94	
Silver	ND	mg/L	0.020	6010	16 MAY 94	18 MAY 94	

Note B : Compound is also detected in the blank.

ND = Not detected
NA = Not applicable

Reported By: Scott Heideman

Approved By: Richard Persichitte

Toxicity Characteristic Metals
TCLP Leachate

Client Name: RUST Environment and Infrastructure
Client ID: COMP-2/VCOMP-2-3
Lab ID: 035093-0002-SA
Matrix: SOIL

Sampled: 17 MAR 94
Received: 18 MAR 94
Authorized: 27 APR 94

Leached: 12 MAY 94
Prepared: See Below
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date	
Arsenic	0.091	mg/L	0.20	6010	16 MAY 94	18 MAY 94	J
Barium	1.5	mg/L	0.020	6010	16 MAY 94	18 MAY 94	B
Cadmium	0.018	mg/L	0.010	6010	16 MAY 94	18 MAY 94	
Chromium	0.0085	mg/L	0.020	6010	16 MAY 94	18 MAY 94	J
Lead	0.30	mg/L	0.10	6010	16 MAY 94	18 MAY 94	
Selenium	ND	mg/L	0.40	6010	16 MAY 94	18 MAY 94	
Silver	ND	mg/L	0.020	6010	16 MAY 94	18 MAY 94	

Note J : Result is detected below the reporting limit or is an estimated concentration.

Note B : Compound is also detected in the blank.

ND = Not detected
NA = Not applicable

Reported By: Scott Heideman

Approved By: Richard Parsichitte

Toxicity Characteristic Metals
TCLP Leachate

Client Name: RUST Environment and Infrastructure
Client ID: COMP-3/VCOMP-3-3
Lab ID: 035093-0003-SA
Matrix: SOIL

Sampled: 17 MAR 94
Received: 18 MAR 94
Authorized: 27 APR 94

Leached: 12 MAY 94
Prepared: See Below
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic	ND	mg/L	0.20	6010	16 MAY 94	18 MAY 94
Barium	1.7	mg/L	0.020	6010	16 MAY 94	18 MAY 94 B
Cadmium	0.028	mg/L	0.010	6010	16 MAY 94	18 MAY 94
Chromium	ND	mg/L	0.020	6010	16 MAY 94	18 MAY 94
Lead	ND	mg/L	0.10	6010	16 MAY 94	18 MAY 94
Selenium	ND	mg/L	0.40	6010	16 MAY 94	18 MAY 94
Silver	ND	mg/L	0.020	6010	16 MAY 94	18 MAY 94

Note B : Compound is also detected in the blank.

ND = Not detected
NA = Not applicable

Reported By: Scott Heideman

Approved By: Richard Persichitte

QC LOT ASSIGNMENT REPORT
Metals Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
035093-0001-SA	LEACHATE	ICP-TL	16 MAY 94-9X	16 MAY 94-9A
035093-0002-SA	LEACHATE	ICP-TL	16 MAY 94-9X	16 MAY 94-9A
035093-0003-SA	LEACHATE	ICP-TL	16 MAY 94-9X	16 MAY 94-9A

DUPLICATE CONTROL SAMPLE REPORT
Metals Analysis and Preparation

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	Measured AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Category: ICP-TL								
Matrix: LEACHATE								
QC Lot: 16 MAY 94-9X								
Concentration Units: mg/L								
Aluminum	2.0	1.91	2.01	1.96	98	80-120	5.3	20
Antimony	0.50	0.532	0.471	0.501	100	80-120	12	20
Arsenic	0.50	0.490	0.457	0.474	95	80-120	7.1	20
Barium	2.0	1.96	2.04	2.00	100	80-120	3.8	20
Beryllium	0.050	0.0484	0.0529	0.0506	101	80-120	8.9	20
Cadmium	0.050	0.0571	0.0505	0.0538	108	80-120	12	20
Chromium	0.20	0.203	0.207	0.205	103	80-120	2.2	20
Cobalt	0.50	0.495	0.504	0.500	100	80-120	1.8	20
Copper	0.25	0.244	0.250	0.247	99	80-120	2.6	20
Iron	1.00	0.903	0.966	0.935	93	80-120	6.8	20
Lead	0.50	0.510	0.502	0.506	101	80-120	1.6	20
Manganese	0.50	0.486	0.502	0.494	99	80-120	3.3	20
Nickel	0.50	0.480	0.498	0.489	98	80-120	3.7	20
Selenium	0.5	0.518	0.465	0.492	98	80-120	11	20
Silver	0.050	0.0487	0.0452	0.0470	94	80-120	7.3	20
Vanadium	0.50	0.451	0.474	0.463	93	80-120	5.0	20
Zinc	0.50	0.501	0.527	0.514	103	80-120	5.1	20

Calculations are performed before rounding to avoid round-off errors in calculated results.

METHOD BLANK REPORT
Metals Analysis and Preparation

Test: ICP-OTC-TCLP-L
Matrix: SOIL
QC Lot: 16 MAY 94-9X QC Run: 16 MAY 94-9A

Analyte	Result	Units	Reporting Limit
Arsenic	ND	mg/L	0.20
Barium	0.11	mg/L	0.020
Cadmium	ND	mg/L	0.010
Chromium	ND	mg/L	0.020
Lead	ND	mg/L	0.10
Selenium	ND	mg/L	0.40
Silver	ND	mg/L	0.020

Enseco
A Corning Company

☐ Rocky Mountain Analytical Laboratory
4955 Yarrow Street
Arvada, CO 80002
303/421-6611 FAX: 303/431-7171

☐ Enseco Houston
1620 East North Belt Drive
Suite 120
Houston, TX 77032
713/987-9767 FAX: 713/987-9769

CHAIN OF CUSTODY

PROJECT CLIENT: Rust E.I.
PROJECT: Ft. Carson Grit/Oil Pit
SAMPLING COMPANY: Rust E.I.
SAMPLING SITE: Ft. Carson
TRANSFERRED BY: R. Thompson

SAMPLE SAFE™ CONDITIONS

RECEIVED BY: B. Mager
SEAL INTACT UPON RECEIPT BY SAMPLING COMPANY: Yes
SEAL NUMBER: 1007
SEAL INTACT UPON RECEIPT BY LAB: ☒ Yes ☐ No
SEAL NUMBER: 314
CONDITION OF CONTENTS: good
SAMPLE CONTENTS TEMP: °C
SAMPLING STATUS: ☐ Done ☒ Continuing Until Dec. 31st, 1994
CONTENTS TEMPERATURE UPON RECEIPT BY LAB: 9.4 °C

DATE	TIME	SAMPLE ID/DESCRIPTION	SAMPLE TYPE	# CONTAINERS	ANALYSES PARAMETERS	REMARKS
3/17/94	1450 1030	COMP-1 -01	sludge	2	TCL Semi-VOA, Pesticides, Target metals-PP	
	1430 1100	VCOMP-1-3		1	TCL VOA's	
	1230	COMP-2 -02		2	Target metals-PP TCL Semi-VOA, Pesticides	
	1300	VCOMP-2-3		1	TCL VOA	
	1010 1700	COMP-3 -03		2	TCL Pesticides, Semi-VOA P.P. Metals	
	1150 1730	VCOMP-3-3		1	TCL VOA	

CUSTODY TRANSFERS PRIOR TO SHIPPING

RELINQUISHED BY (SIGNED)	RECEIVED BY (SIGNED)	DATE	TIME
[signature]		3/17/94	1700

SHIPPING DETAILS

DELIVERED TO SUPPLIER?
METHOD OF SHIPMENT:
AIRBILL NUMBER:
RECEIVED FOR LAB BY: Bonnie Mayer
DATE/TIME: 3/18/94 10:05
ENSECO PROJECT NUMBER: 24336 35093

White - CLIENT Pink - LAB

Enc-2011

Analytical Data for City of Colorado Springs Water System
Colorado Springs, 1994

CITY OF COLORADO SPRINGS 1993 WATER QUALITY SUMMARY

SYSTEM: MESA PLANT EFFLUENT

ANALYSIS	MCL	AVERAGE	MINIMUM	MAXIMUM
Physical				
Turbidity, NTU	1	0.05	0.02	0.10
Color Intensity	15*	2	1	5
Threshold Odor Number	3*	1.3	1.0	1.4
Chlorine Residual	NL	0.65	0.55	0.80
Temperature, Centigrade	NL	9	5	17
Microbiological				
Total Coliform(TC)/100 ml	0"	0	0	0
Inorganic Chemicals				
Fluoride	4.0,2.0*	1.62	1.21	2.11
Nitrate	10.0	0.19	0.12	0.28
Chloride	250*	5.7	3.4	8.1
pH	6.5-8.5*		7.86	8.28
Sulfate	250*	9.2	8.2	11.2
Total Dissolved Solids	500*	76	68	84
HCO3 Alkalinity as CaCO3	NL	42	32	52
Hardness as CaCO3	NL	43	31	52
Silica	NL	7.5	6.3	9.6
Specific Conductance, um	NL	129	101	160
Metals				
Antimony	0.006	<0.001	<0.001	<0.001
Arsenic	0.05	<0.004	<0.004	<0.004
Barium	1	0.019	0.014	0.025
Beryllium	0.004	<0.0004	<0.0004	<0.0004
Cadmium	0.010	<0.00010	<0.00010	<0.00010
Chromium	0.05	<0.0004	<0.0004	<0.0004
Mercury	0.002	<0.0002	<0.0002	<0.0002
Nickel	0.1	<0.005	<0.005	<0.005
Selenium	0.01	<0.0010	<0.0010	<0.0010
Silver	0.05	<0.0005	<0.0005	<0.0005
Thallium	0.002	<0.0010	<0.0010	<0.0010
Lead	^	<0.0010	<0.0010	<0.0010
Copper	^	0.006	0.002	0.010
Iron	0.30*	<0.08	<0.08	<0.08
Manganese	0.050*	<0.04	<0.04	<0.04
Zinc	5.0*	<0.01	<0.01	<0.01
Aluminum	NL	0.058	0.045	0.075
Sodium	NL	10	9.6	11
Potassium	NL	1.5	1.3	1.8
Organic Chemicals				
Total Trihalomethanes	0.100	0.032	0.028	0.035
Volatile Organic Chemicals				
Benzene	0.005	<0.0005	<0.0005	<0.0005
Carbon Tetrachloride	0.005	<0.0005	<0.0005	<0.0005
p-Dichlorobenzene	0.075	<0.0005	<0.0005	<0.0005
1,2-Dichloroethane	0.005	<0.0005	<0.0005	<0.0005
1,1-Dichlorethene	0.007	<0.0005	<0.0005	<0.0005
1,1,1-Trichloroethane	0.20	<0.0005	<0.0005	<0.0005
Trichloroethene	0.005	<0.0005	<0.0005	<0.0005
Vinyl Chloride	0.002	<0.0005	<0.0005	<0.0005
Pesticides				
Lindane	0.004	<0.0001	<0.0001	<0.0001
Endrin	0.0002	<0.0001	<0.0001	<0.0001
Methoxychlor	0.1	<0.0002	<0.0002	<0.0002
Toxaphene	0.005	<0.002	<0.002	<0.002
Herbicides				
2,4-D	0.1	<0.005	<0.005	<0.005
Silvex	0.01	<0.002	<0.002	<0.002

NL = no limits set

* = Secondary nonenforceable standard, established for aesthetic reasons.

^ = May be determined by the State.

MCL = Maximum Contaminant Level, reported in milligrams/liter, except where noted.

" = 5 % of all samples can be TC positive if confirmation is TC, not fecal coliform.

CITY OF COLORADO SPRINGS
1991 WATER QUALITY SUMMARY

SYSTEM: PINELLO WELLS

ANALYSIS	MCL	AVERAGE	MINIMUM	MAXIMUM
Physical				
Turbidity, NTU	1	0.64	0.09	1.17
Color Intensity	15*	2	1	3
Threshold Odor Number	3*	1.2	1.0	1.4
Chlorine Residual,	NL	0.82	0.65	0.90
Temperature, Centigrade	NL	14	13	15
Microbiological				
Total Coliform/100 ml	1	0	0	0
Inorganic Chemicals				
Fluoride	4.0,2.0*	0.95	0.90	0.99
Nitrate	10.0	6.48	6.31	6.64
Chloride	250*	22	21	23
pH	6.5-8.5*		7.17	7.17
Sulfate	250*	67.2	63.1	71.3
Total Dissolved Solids	500*	375	372	378
HCO3 Alkalinity as CaCO3	NL	163	160	166
Hardness as CaCO3	NL	216	207	224
Silica	NL	24.3	24.0	24.6
Ammonia	NL	<0.05	<0.05	<0.05
Specific Conductance, umhos	NL	559	550	568
Metals				
Arsenic	0.05	<0.004	<0.004	<0.004
Barium	1	0.099	0.088	0.110
Cadmium	0.010	<0.0001	<0.0001	<0.0001
Chromium	0.05	0.0007	0.0007	0.0007
Lead	0.05	<0.001	<0.001	<0.001
Mercury	0.002	<0.0002	<0.0002	<0.0002
Selenium	0.01	0.003	0.003	0.003
Silver	0.05	<0.0005	<0.0005	<0.0005
Copper	1.0*	<0.012	<0.012	<0.012
Iron	0.30*	<0.040	<0.040	<0.040
Manganese	0.050*	<0.020	<0.020	<0.020
Zinc	5.0*	<0.005	<0.005	0.006
Aluminum	NL	<0.005	<0.005	<0.005
Sodium	NL	34	34	35
Potassium	NL	3.3	3.2	3.4
Organic Chemicals				
Total Trihalomethanes	0.100	0.007	0.007	0.007
Volatile Organic Chemicals				
Benzene	0.005	<0.0005	<0.0005	<0.0005
Carbon Tetrachloride	0.005	<0.0005	<0.0005	<0.0005
p-Dichlorobenzene	0.075	<0.0005	<0.0005	<0.0005
1,2-Dichloroethane	0.005	<0.0005	<0.0005	<0.0005
1,1-Dichlorethene	0.007	<0.0005	<0.0005	<0.0005
1,1,1-Trichloroethane	0.20	<0.0005	<0.0005	<0.0005
Trichloroethene	0.005	<0.0005	<0.0005	<0.0005
Vinyl Chloride	0.002	<0.0005	<0.0005	<0.0005
Pesticides				
Lindane	0.004	<0.0001	<0.0001	<0.0001
Endrin	0.0002	<0.0001	<0.0001	<0.0001
Methoxychlor	0.1	<0.0002	<0.0002	<0.0002
Toxaphene	0.005	<0.002	<0.002	<0.002
Herbicides				
2,4-D	0.1	<0.005	<0.005	<0.005
Silvex	0.01	<0.002	<0.002	<0.002

MCLs are reported in mg/l except where noted.
* = Secondary standard
NL = no limits set

CITY OF COLORADO SPRINGS 1993 WATER QUALITY SUMMARY

SYSTEM: FOUNTAIN VALLEY PLANT EFFLUENT

ANALYSIS	MCL	AVERAGE	MINIMUM	MAXIMUM
Physical				
Turbidity, NTU	1	0.03	0.01	0.05
Color Intensity	15*	2	1	4
Threshold Odor Number	3*	1.3	1.0	2.0
Chlorine Residual	NL	1.1	0.95	1.2
Temperature, Centigrade	NL	14	8	20
Microbiological				
Total Coliform(TC)/100 ml	0"	0	0	0
Inorganic Chemicals				
Fluoride	4.0,2.0*	0.45	0.30	0.58
Nitrate	10.0	0.21	0.08	0.29
Chloride	250*	9.1	5.3	12.0
pH	6.5-8.5*		7.36	7.81
Sulfate	250*	111	63	148
Total Dissolved Solids	500*	283	176	366
HCO3 Alkalinity as CaCO3	NL	98	66	124
Hardness as CaCO3	NL	189	118	242
Silica	NL	7.7	6.2	9.4
Specific Conductance, um	NL	441	282	557
Metals				
Antimony	0.006	<0.001	<0.001	<0.001
Arsenic	0.05	<0.004	<0.004	<0.004
Barium	1	0.062	0.041	0.077
Beryllium	0.004	<0.0004	<0.0004	<0.0004
Cadmium	0.010	<0.00010	<0.00010	<0.00010
Chromium	0.05	<0.0004	<0.0004	0.0004
Mercury	0.002	<0.0002	<0.0002	<0.0002
Nickel	0.1	<0.005	<0.005	<0.005
Selenium	0.01	0.0024	0.0011	0.0030
Silver	0.05	<0.0005	<0.0005	<0.0005
Thallium	0.002	<0.0010	<0.0010	<0.0010
Lead	*	<0.0010	<0.0010	<0.0010
Copper	*	0.008	0.005	0.012
Iron	0.30*	<0.08	<0.08	<0.08
Manganese	0.050*	<0.04	<0.04	<0.04
Zinc	5.0*	<0.01	<0.01	<0.01
Aluminum	NL	0.059	0.035	0.080
Sodium	NL	20	12	26
Potassium	NL	2.7	2.0	3.3
Organic Chemicals				
Total Trihalomethanes	0.100	0.053	0.044	0.063
Volatile Organic Chemicals				
Benzene	0.005	<0.0005	<0.0005	<0.0005
Carbon Tetrachloride	0.005	<0.0005	<0.0005	<0.0005
p-Dichlorobenzene	0.075	<0.0005	<0.0005	<0.0005
1,2-Dichloroethane	0.005	<0.0005	<0.0005	<0.0005
1,1-Dichlorethene	0.007	<0.0005	<0.0005	<0.0005
1,1,1-Trichloroethane	0.20	<0.0005	<0.0005	<0.0005
Trichloroethene	0.005	<0.0005	<0.0005	<0.0005
Vinyl Chloride	0.002	<0.0005	<0.0005	<0.0005
Pesticides				
Lindane	0.004	<0.0001	<0.0001	<0.0001
Endrin	0.0002	<0.0001	<0.0001	<0.0001
Methoxychlor	0.1	<0.0002	<0.0002	<0.0002
Toxaphene	0.005	<0.002	<0.002	<0.002
Herbicides				
2,4-D	0.1	<0.005	<0.005	<0.005
Silvex	0.01	<0.002	<0.002	<0.002

NL = no limits set

* = Secondary nonenforceable standard, established for aesthetic reasons.

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